ELECTRICAL REVIEW

TECHNOLOGY

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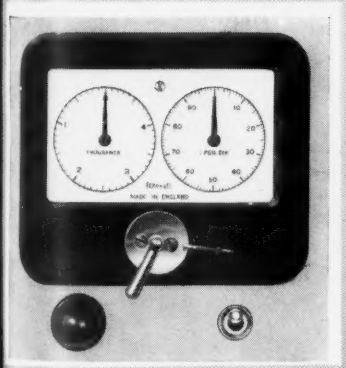
DETROIT

The test bench carries two rows of twenty meters, the upper row warming prior to testing, whilst the lower row is being calibrated.

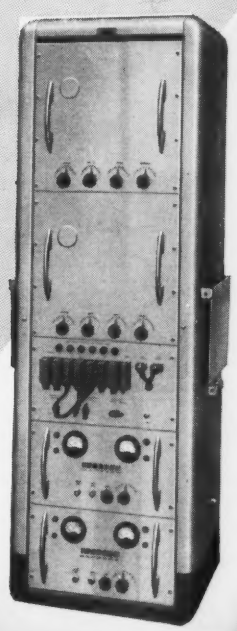
FERRANTI

HIGH SPEED TESTING EQUIPMENT

for A.C. singlephase meters.



One of the slave sub-standard counters which are mounted on a panel below the meters on test.



A completely self-contained unit for installation in new testing stations for expediting meter adjustments and calibration to close limits. Meters are stroboscopically tested on high loads and by timing from the counters on high and low loads. Write for list M.54 which contains full particulars.

Conversion equipment supplied separately for modernising existing conventional test equipment.

FERRANTI LTD HOLLINWOOD · LANCS
London Office: KERN HOUSE, 36 KINGSWAY, W.C.2.

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Stanton 8K Spun Concrete Lighting Columns (shown in our picture) form part of the Stanton range approved by the Council of Industrial Design or passed by the Royal Fine Art Commissions.

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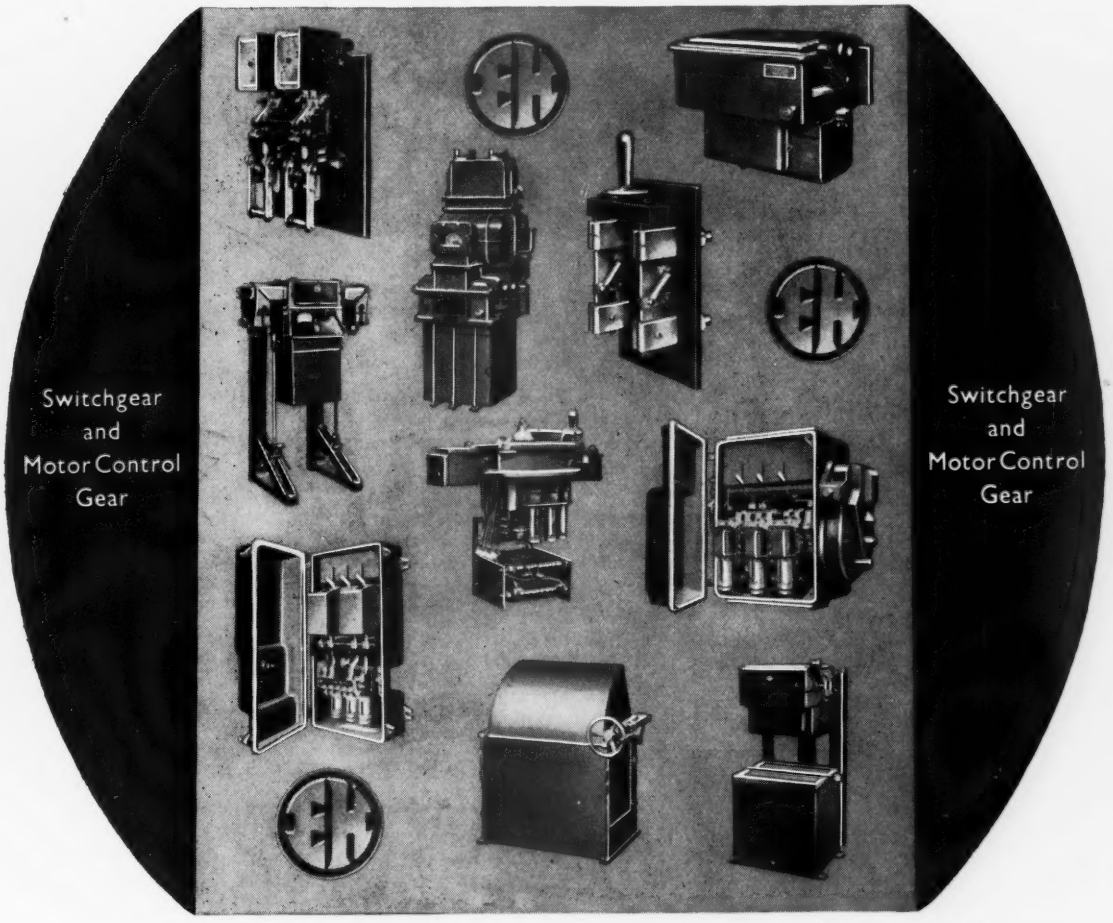

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MOTOR CONTROL GEAR $\frac{1}{4}$/5000 H.P.

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637 (B)

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FOR MACHINE TOOLS AND LIKE APPLICATIONS

The surface mounting pattern has conduit knockouts at top and bottom.

Rated at 15 amps. 500 volts, triple pole for use with A.C. motors up to 7½ H.P. max.

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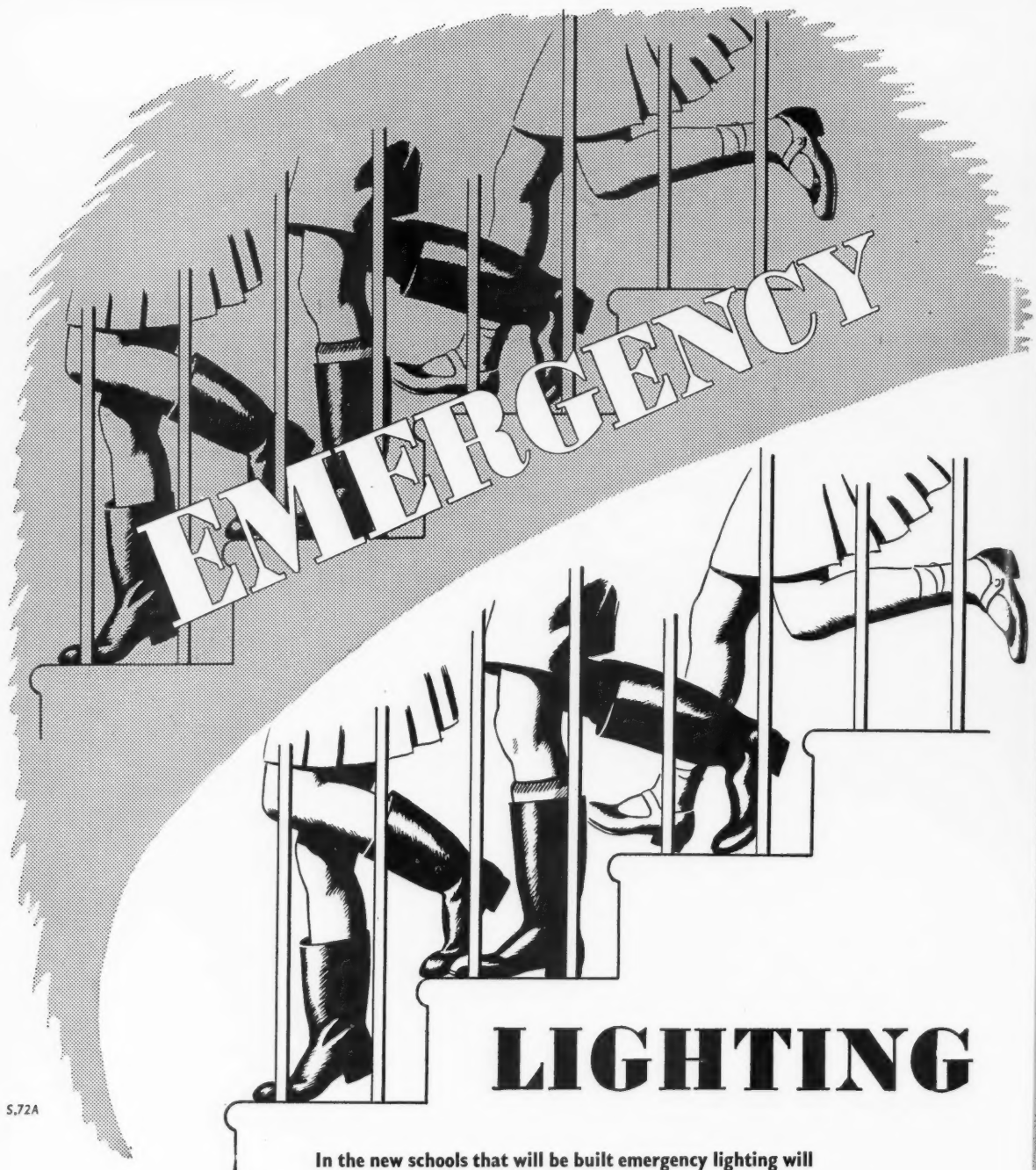

LIGHTING

S.72A

In the new schools that will be built emergency lighting will be installed. Not, it is hoped, as an afterthought. The installation of the standby system which guards against all the risks of mains interruption should be planned at the same time as the main lighting is planned. Chloride Batteries Limited, makers of Keepalite, the automatic emergency lighting system, offer the advisory services of their engineers to architects and electrical contractors in any part of Britain.

Keepalite FOR SCHOOLS

A Product of Chloride Batteries Limited, Exide Works, Clifton Junction, Swinton, Manchester, and Grosvenor Gardens House, Grosvenor Gardens, SW1

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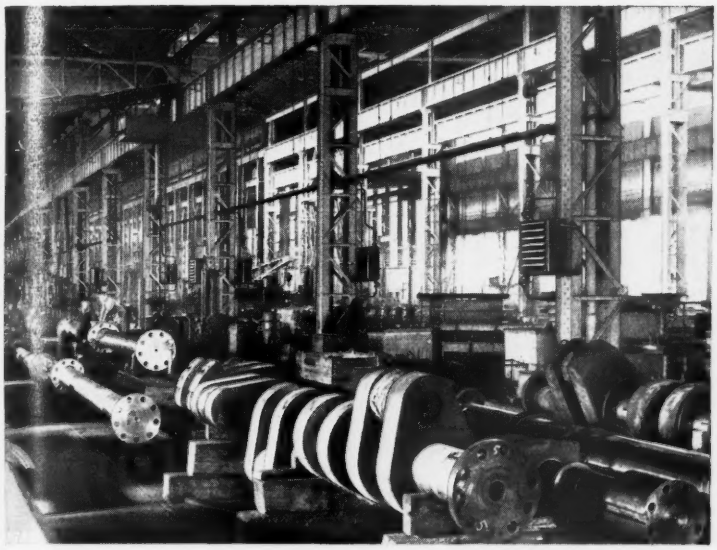

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promote better working conditions and improve the earning power of workmen

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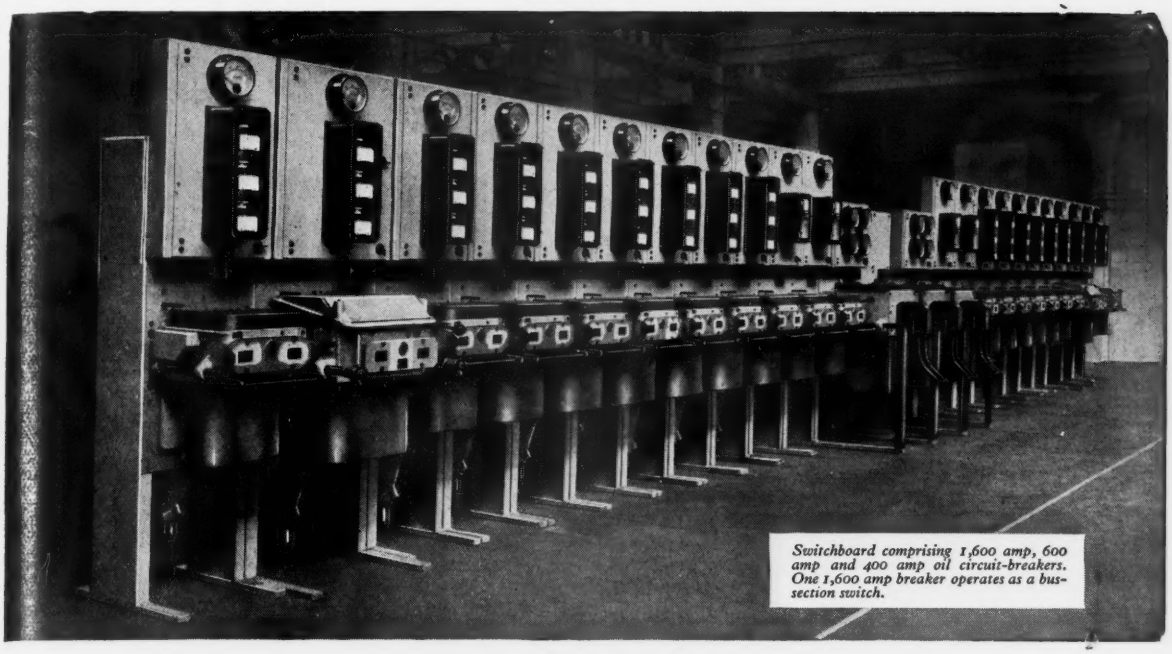

Switchboard comprising 1,600 amp, 600 amp and 400 amp oil circuit-breakers. One 1,600 amp breaker operates as a bus-section switch.

J. & P. LOW VOLTAGE SWITCHGEAR

These two switchboards supplied to the Iraq Petroleum Company are typical of J. & P. low voltage oil-break switchgear. Designed and A.S.T.A. certified for ratings up to 2,000 amp, 30 MVA, this gear can be supplied with horizontal isolation if required. Power closing mechanisms are available for the higher current ratings and rupturing capacities.

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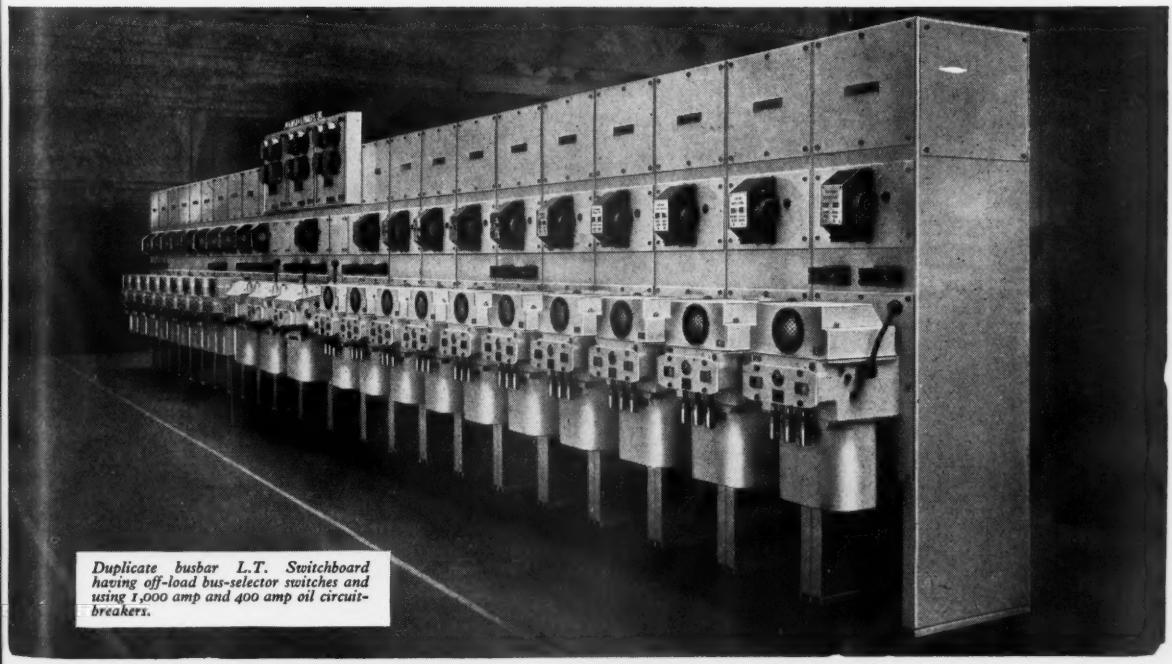

Duplicate busbar L.T. Switchboard having off-load bus-selector switches and using 1,000 amp and 400 amp oil circuit-breakers.

I was hoping for a quiet life —but what do I get? A production drive! And guess who's driving? I am, of course! "We know you can do it" they always say. And, between you and me, I *can*. Oh well, I suppose it's just the way I'm made!

I'm a Busy Little Bee from G.E.C.

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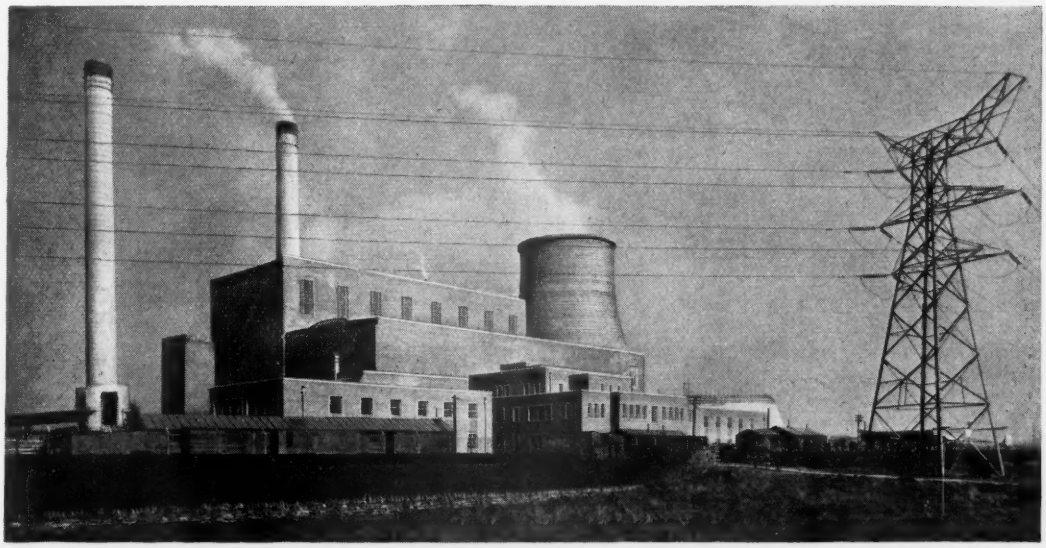
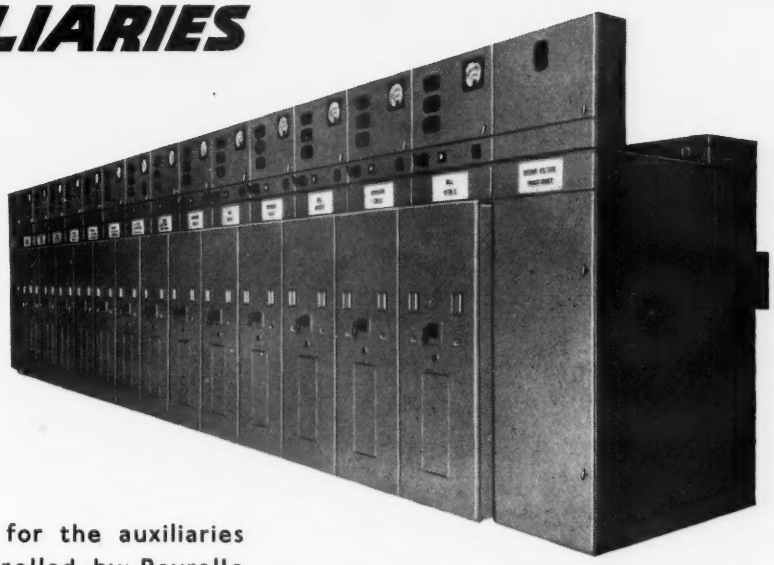


Photograph by courtesy of B.E.A.

SWITCHGEAR FOR AUXILIARIES



Supplies for the auxiliaries are controlled by Reyrolle class-SA 3,300-volt and 415-volt air-break switchgear

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FOUNDRY
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The illustration shows an example of foundry lighting using 60 watt 'Dunelm' lighting fittings.

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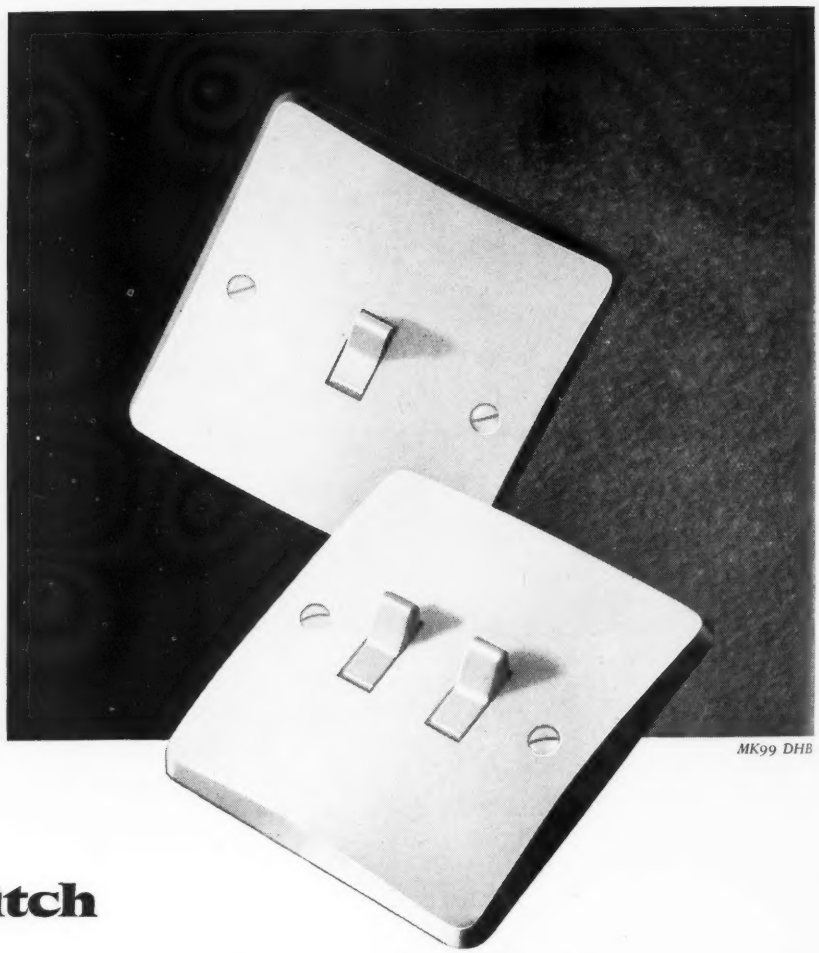

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Every detail of the distinctive new **Plateswitch** is worth studying. The quality of the materials and the finish bear the closest possible inspection. Installation is made easier by provision for automatic levelling with the plaster and generous and well-positioned terminals. Both one and two gang patterns have BS 1299 fixing centres. The action is positive, yet the **Plateswitch** is easily operated in silence. In its clean modern lines, too, the **Plateswitch** is right up to the minute.

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★ Every **Plateswitch** is supplied with four screws to match—two 4BA for metal boxes and two No. 5 wood screws for wood boxes.

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FLUROLIER fittings Regd.

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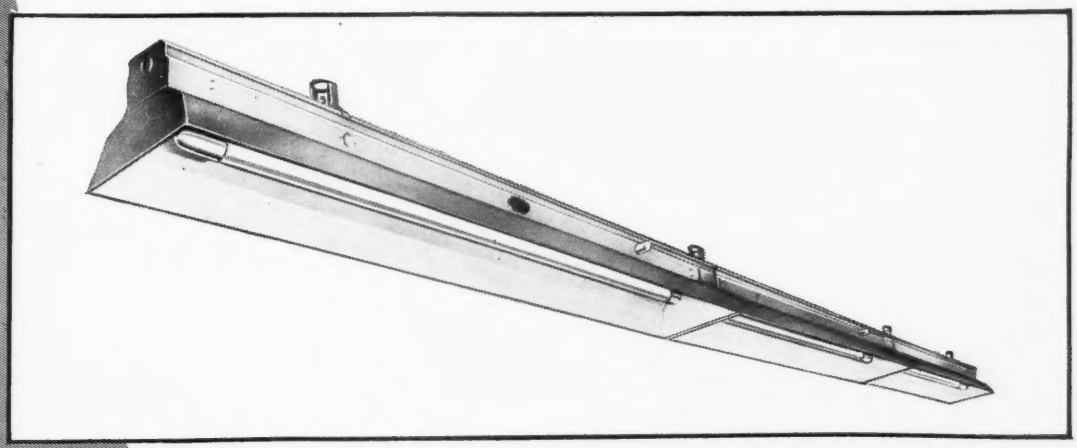

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CONSTRUCTION: Toroidally wound auto-transformers, with tracks formed on one face of the windings.
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BRUSHES: The brushes are of a special carbon chosen for its contact resistance characteristics, shaped to give minimum loss, maximum strength and longest life.
There are 4 models of the Berco Rotary Regavolt available :—

Model	Max. Input Volts at 50/60 cycles	Max. Output Voltage Range at no load	Rated Current	Weight	PRICE £ s.
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41B	115	0–135	2.25		
42A	250	0–270	2.0	6½ lbs.	7 18
42B	115	0–135	5.0		

The Berco Rotary Regavolt provides a highly economical, compact and reliable means of obtaining a continuously variable output voltage, without the heat losses associated with resistances. Its outstanding advantage over resistance control is that any alternating current load within normal rating can be controlled from zero to full voltage without the necessity of special designing for individual applications. Thus, one rotary Regavolt can be used in place of a number of adjustable resistances. In addition, an increase in voltage, above the main supply, can be obtained with three of the four Regavolt models. This is an especially valuable feature when the supply voltage is low.

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BERCO

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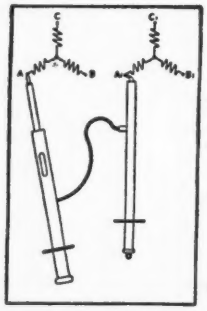

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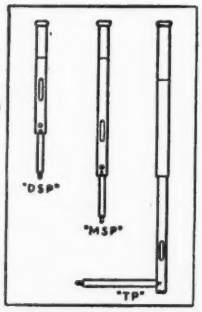

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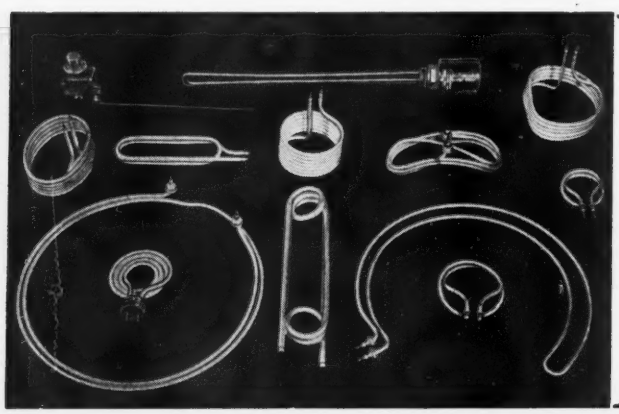

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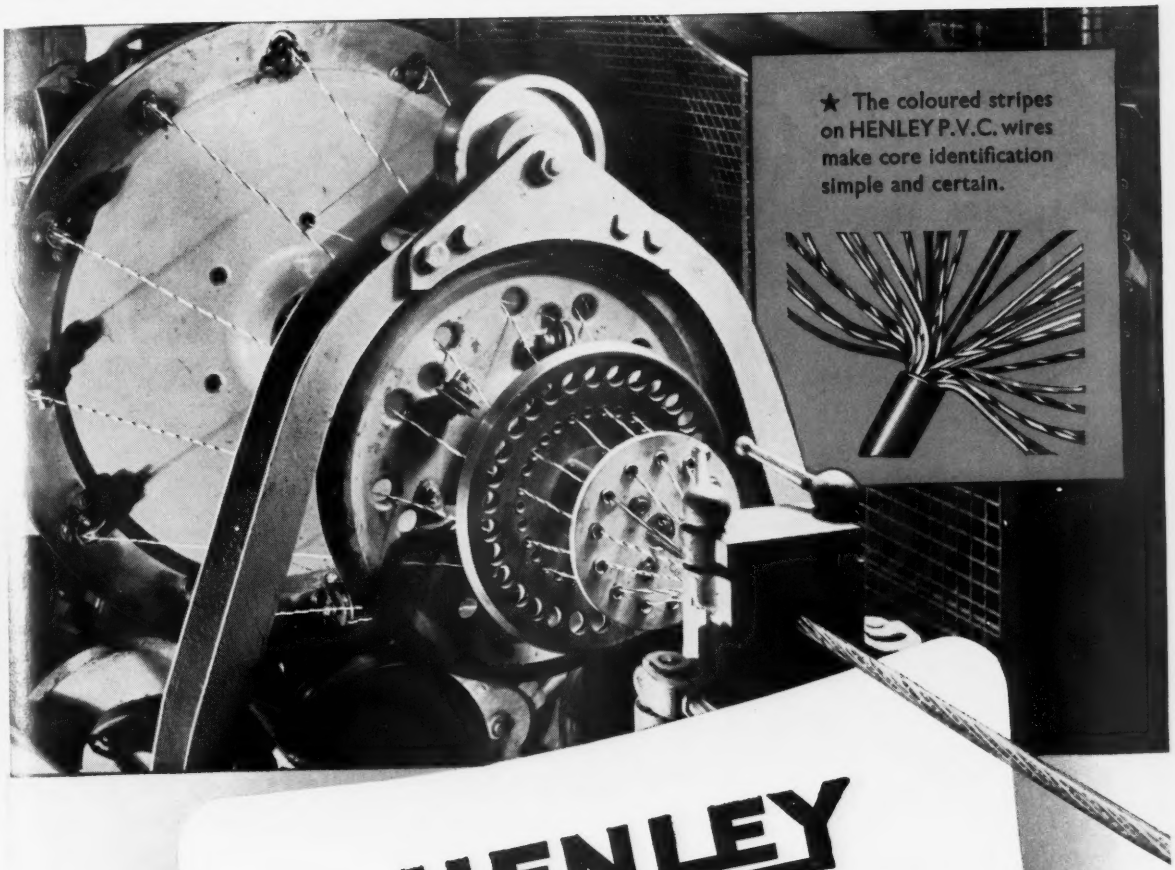

★ The coloured stripes on HENLEY P.V.C. wires make core identification simple and certain.

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Henley's manufacture a very comprehensive range of wires, cables and flexibles insulated with P.V.C. and Polythene for Telecommunications, High Frequency, Television Down Leads, Equipment Wires, etc. Where colour identification of cores is required, the Henley dual marking method provides an extremely wide range of colour combinations. If you have a problem concerning thermoplastic cables Henley's advice is readily available.

★ *Ask for Folder 484 describing HENLEY Colour Striped P.V.C. Wires*

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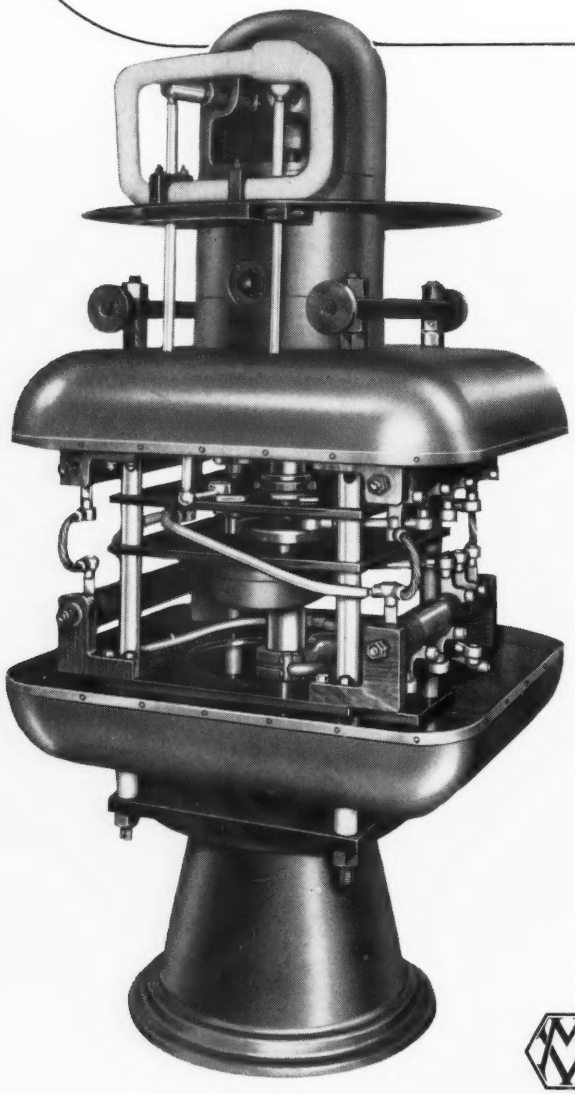


ON-LOAD TAP CHANGING EQUIPMENT FOR 275 kV

The design of Metrovick on-load tap changing gear for the British Electricity Authority 275 kV system follows the principles already proved in practical service. In 1949 the company installed in Holland the highest voltage class "fully insulated" tap changer that had at that time been built. From the original Metrovick work on this and other high voltage systems, the current design for 132/275 kV systems has developed. In tap changers, as in other aspects of transformer design and construction, Metrovick are pioneering advances which set new standards for the industry.

Close-up view with cover removed of selector switch on Metrovick on-load tap changer developed for 220/150 kV three-phase transformer group built for the Netherlands.

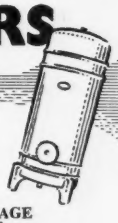
METROPOLITAN-VICKERS
ELECTRICAL CO LTD · TRAFFORD PARK · MANCHESTER, 17

Member of the A.E.I. group of companies

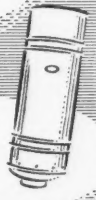
EJA 204

The SANTON range of domestic thermal storage WATER HEATERS

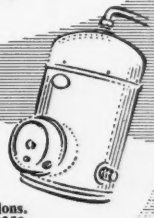
NON-PRESSURE TYPE (N.P.T.)
APPLICATION: For supplying hot water to one point or by means of a swivel swan-neck to two adjacent points. Wall fixing only.
CAPACITIES: 1½, 3, 5 and 12 gallons.
VOLTAGE RANGE: 200/220, 230/250.



PRESSURE TYPE (P.T.F.M.)
APPLICATION: For supplying hot water to two or more points by plumbing to standard tap. CAPACITIES: 20, 30, 50 and 100 gallons floor mounting, also 5, 12, 20 gallons wall mounting. VOLTAGE RANGES: 200/220, 230/250 single phase, 348/380, 400/440, 3 phase.



CISTERN TYPE (D.F.)
APPLICATION: For multipoint service where no existing cistern is available. CAPACITIES: 5, 12 and 20 gallons wall mounting, and 20, 30, 50, 100 gallons floor mounting. VOLTAGE RANGES: 200/220, 230/250, 348/380, 400/440, 3 phase.



PRESSURE TYPE (P.T. 2½ Fm)
APPLICATION: Installed beneath sink, hand-basin or bar-counter it provides a constant supply of hot water for domestic use or glass-washing. CAPACITY: 2½ gallons. VOLTAGE RANGES: 200/220, 230/250. Also available as non-pressure type.

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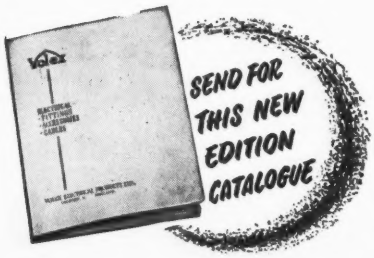

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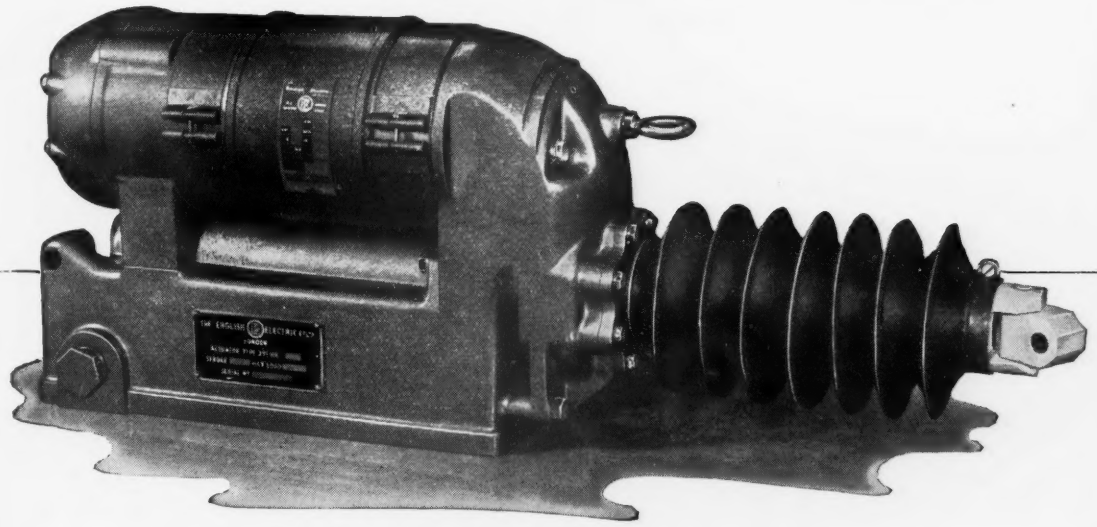

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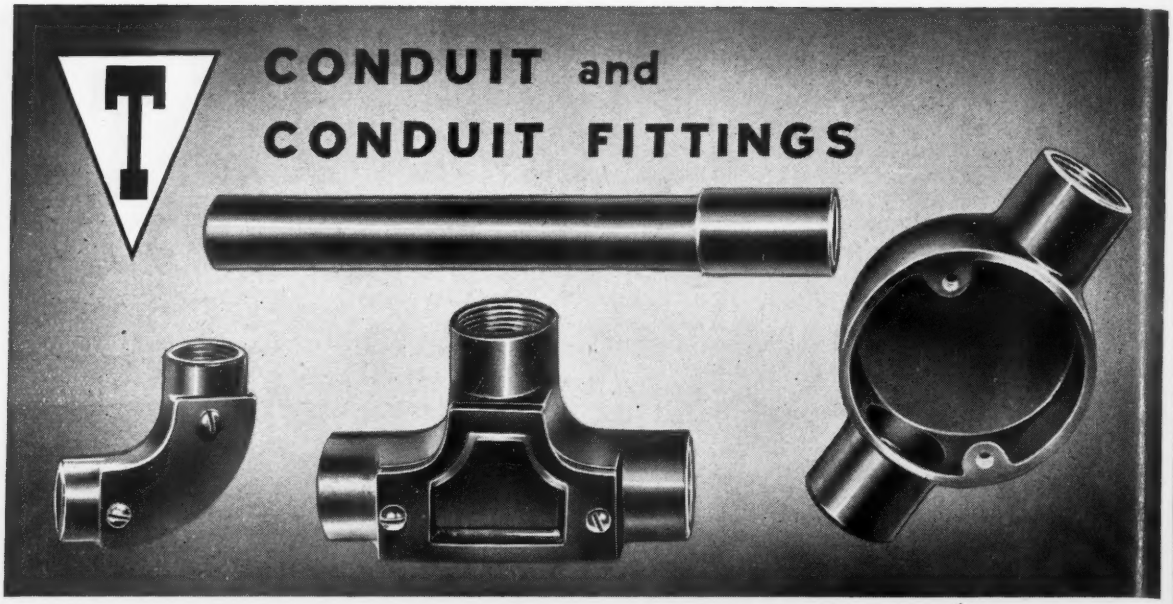

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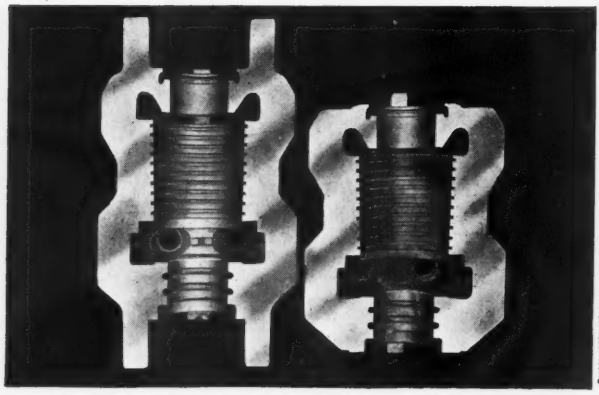

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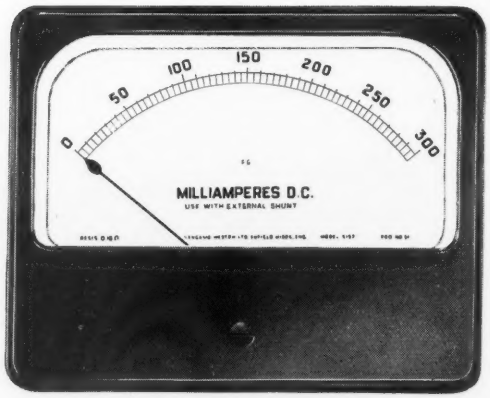

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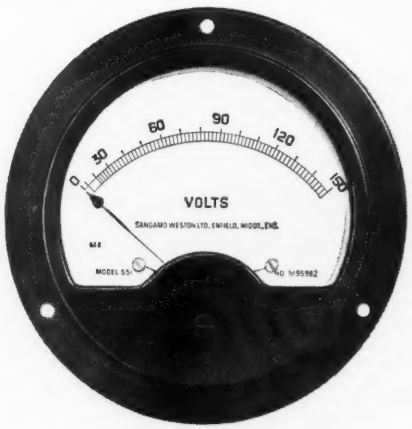

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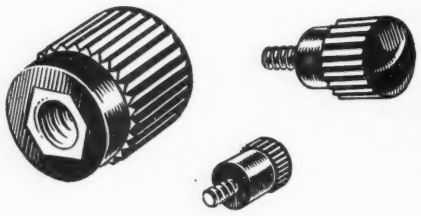

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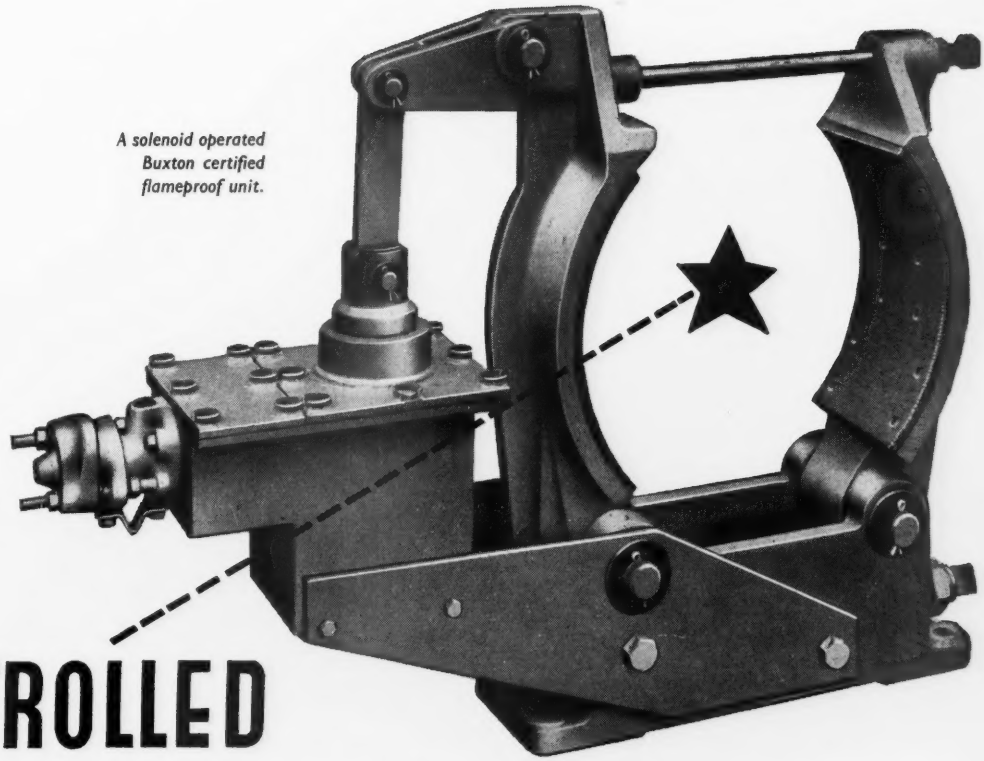

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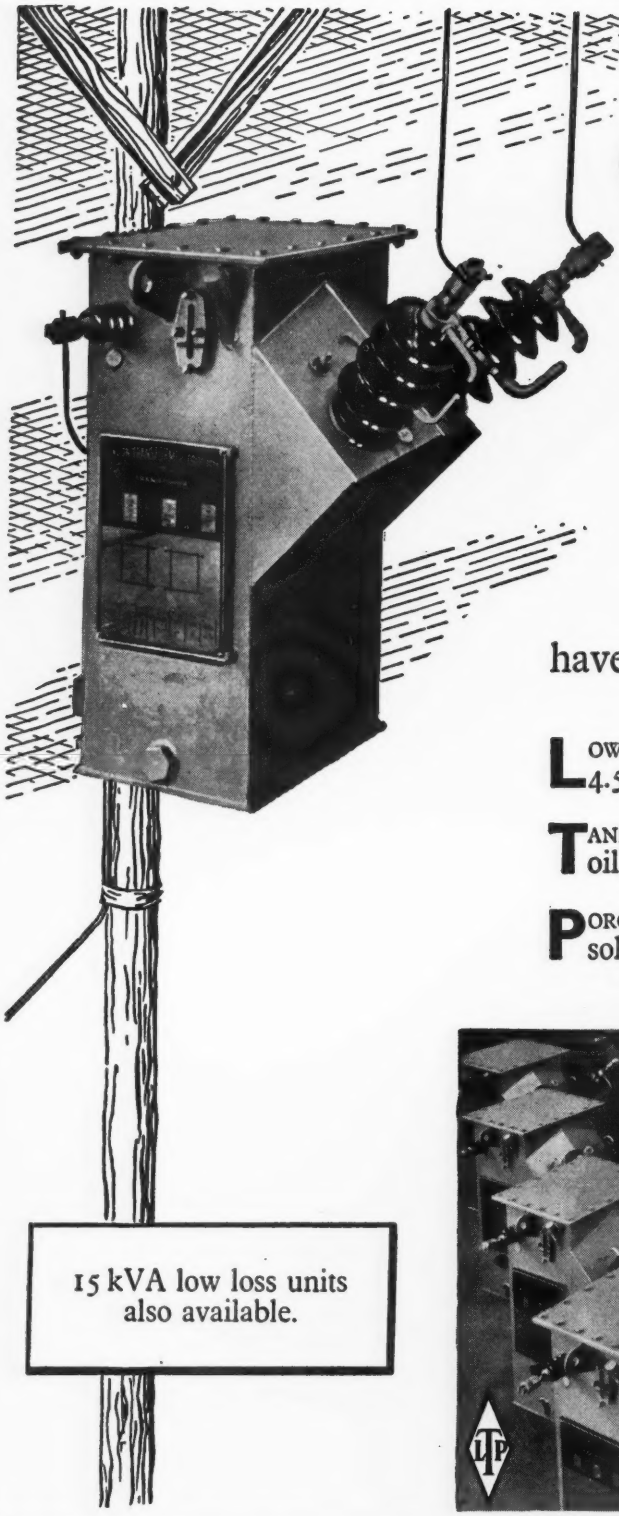

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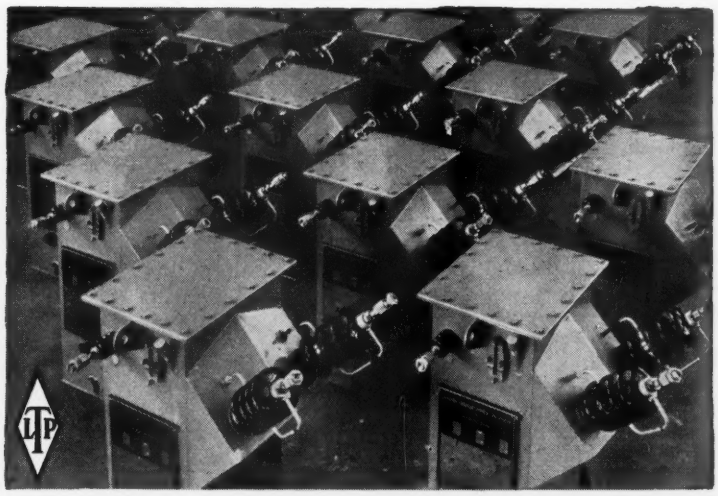

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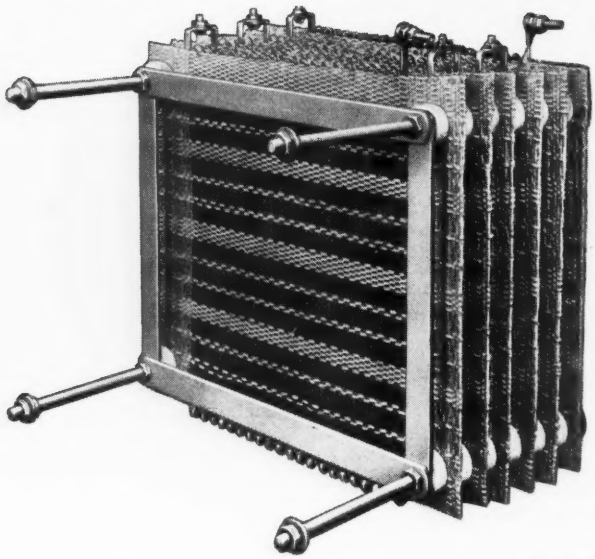

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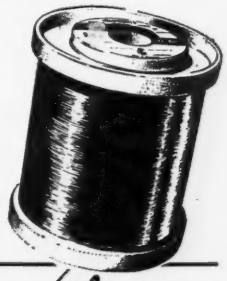

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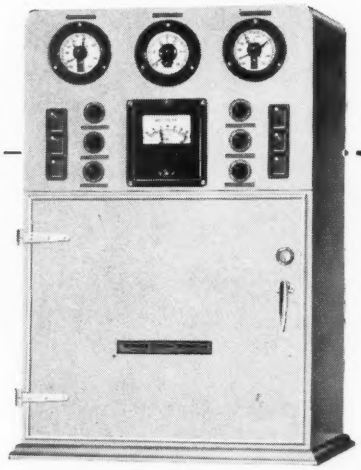

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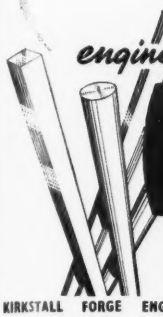

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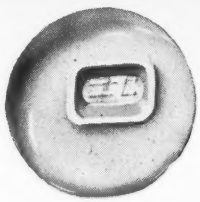

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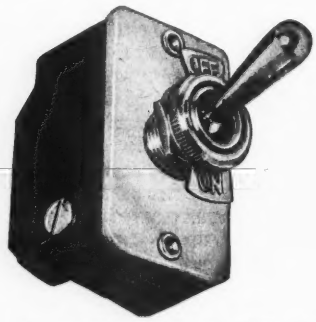

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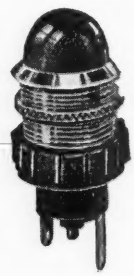

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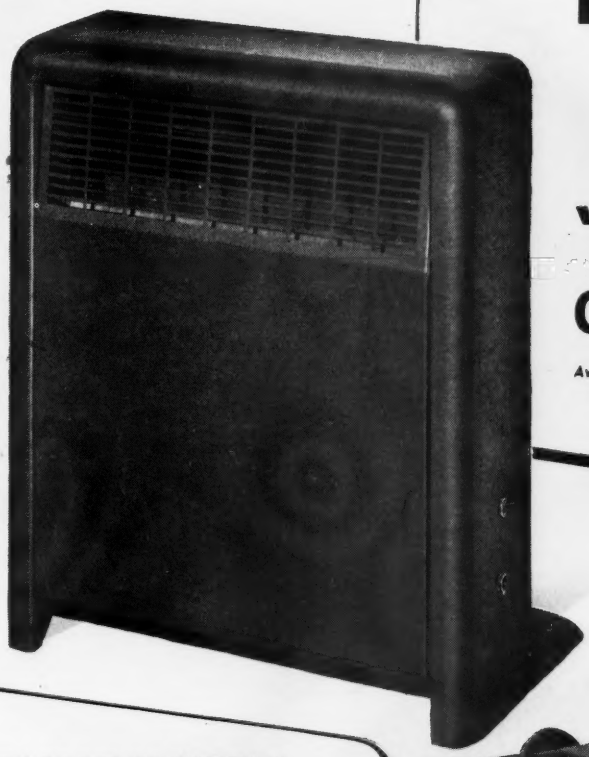

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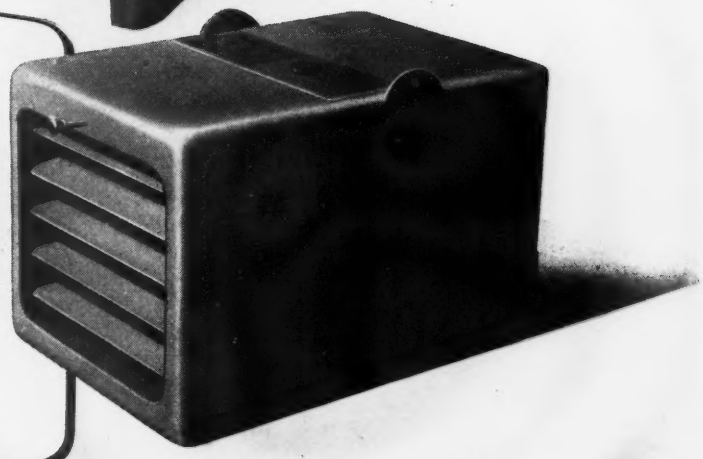

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M. and J. LOSSOS and CO. LTD

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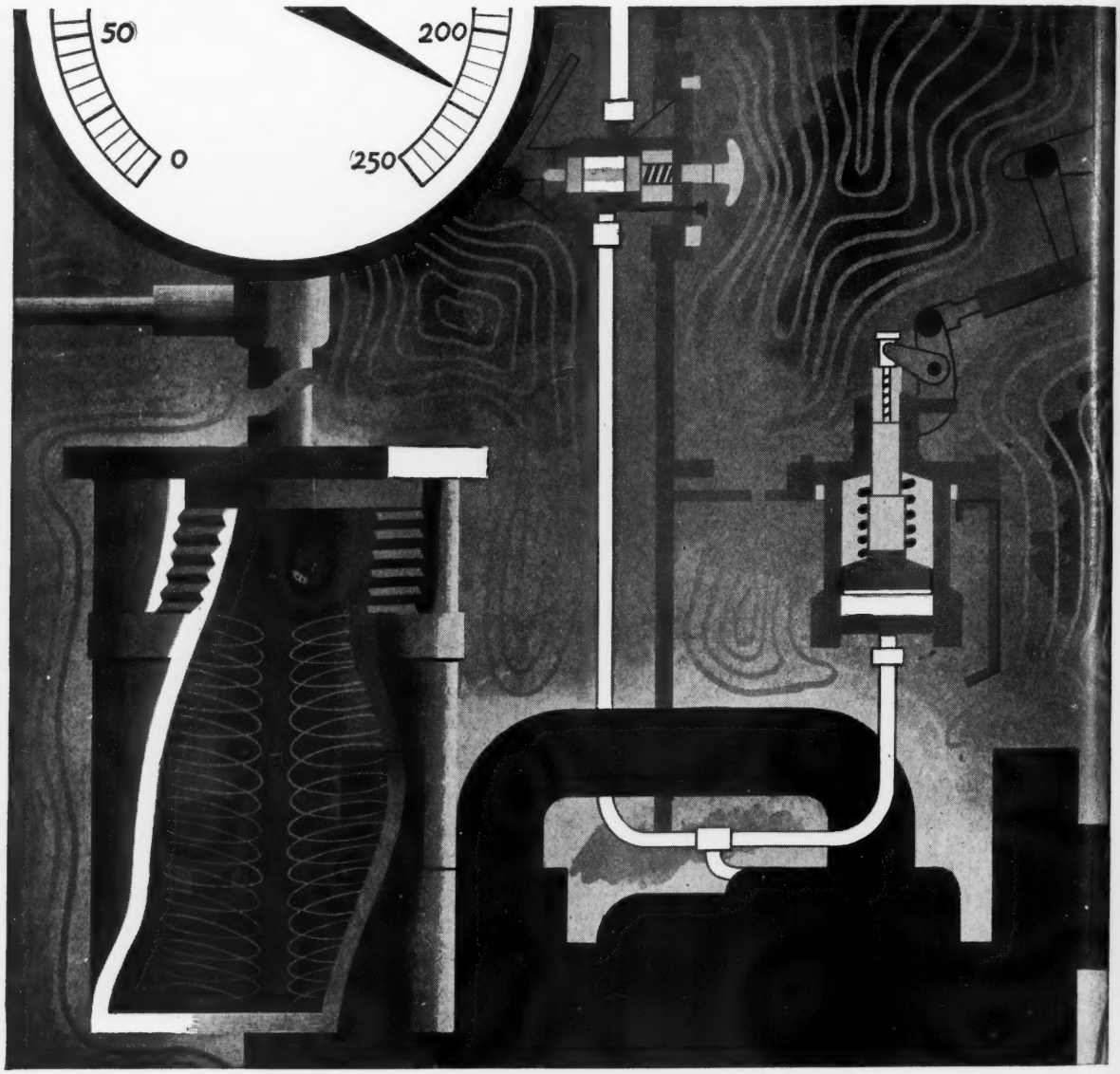


Inhibited for life

Where there's a turbine there must be oil—special oil circulating continuously through bearings and gears. If the turbine is to produce its full quota of electrical energy throughout its life, this oil must do a number of vital jobs.

It must lubricate of course. It must also cool, prevent corrosion, and act as the hydraulic medium in governors, overspeed trips and emergency gear. To do all these things without deterioration a turbine oil must have high resistance to oxidation and good demulsibility, and possess rust preventive properties of a high order.

Shell's answer to the problem is a range of specially selected and refined turbine oils—the Shell Turbo Oils. These contain inhibitors which counteract the effects of water and oxygen throughout the life of the turbine.

Acidity—another enemy—is countered, in many large turbine sets that are Shell-lubricated, by acidity tests at regular intervals. The readings are plotted on a graph kept by Shell as a continuous record of the oil's condition.

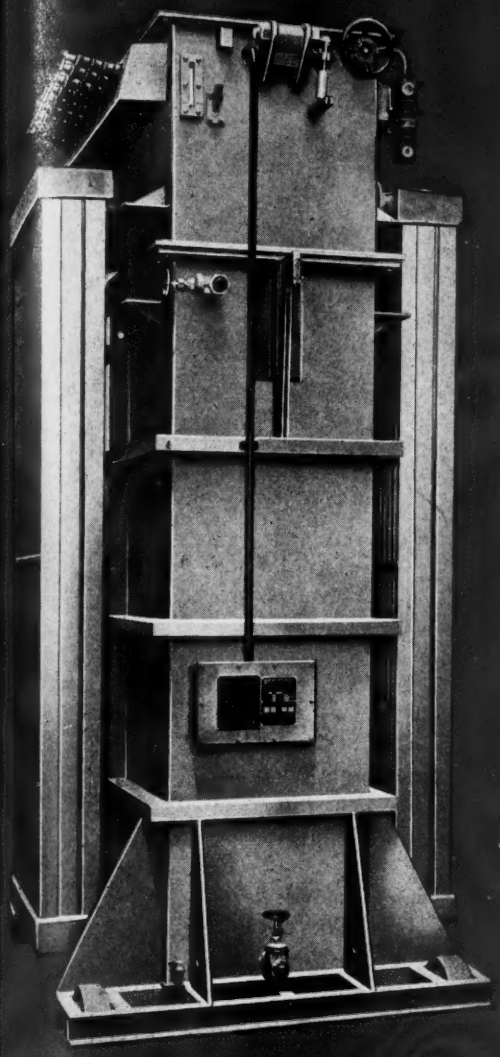
Shell inhibited turbine oils will function efficiently under the severest conditions for the longest possible period—the life of the initial charge is measured in decades. They will do this because they are the product of continuous and comprehensive research, closely geared to progress in turbine design. Even now, Shell experts are experimenting to produce better oils for the turbine of tomorrow.

Shell's laboratories at Thornton, Cheshire, cover an area of 800,000 sq. ft. and are manned by a staff of over 800—that's how Shell makes sure.

SHELL

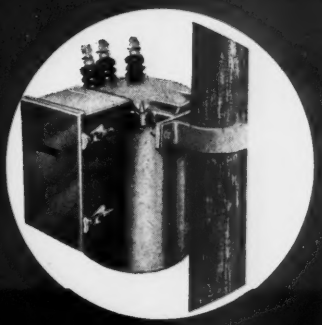
LEADERSHIP IN LUBRICATION

OUR RANGE IS EXTENSIVE



BRENTFORD REGULATOR installed in Canada for automatic control of 2000 kW Electrolytic plant.

Automatic regulators of this type have been supplied by Brentford as line boosters on distribution systems in many parts of the World.



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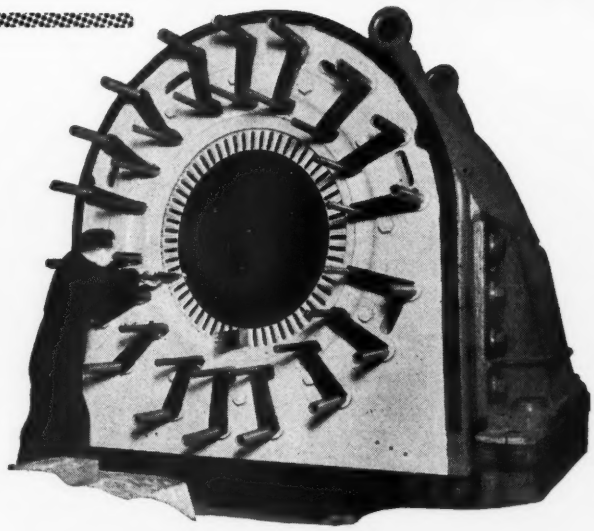
Urgent or intricate —or both?

However urgent, intricate or big the job, if it's a question of electrical repairs, contact your nearest B.E.R.L. works. Illustrated is a typical job—a complete rewind on a 16,500 kVA Alternator. The first new stator bar is just being inserted and the lower view shows this stage completed.



At your next breakdown telephone the District Manager in your area for immediate attention.

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MEKELITE

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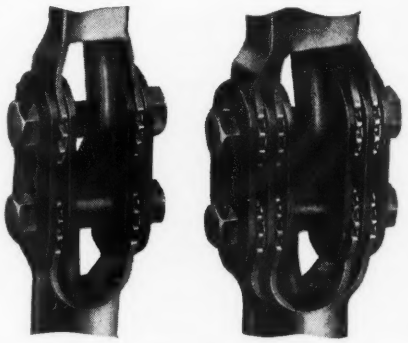

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Bases for wall, bench, ceiling, floor or mounting direct on machines; also portable types. With pillar or short vertical pivot. Six sizes of reflector and various lengths of arm (maximum horizontal reach 54 inch).

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Only our not-so-young friends in the Electrical Industry will remember our first water heater thermostat, the 'WR.' Many of these early instruments are still working satisfactorily and it is on this sure foundation of knowledge and experience that our present-day 'V' thermostat is built.

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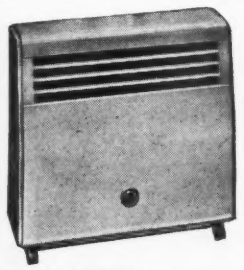
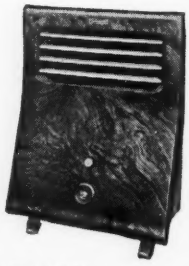


Steel-cased SR Heaters
Handsome floor-standing type with metal case finished in light bronze enamel, fitted with luminous effect. Available in 1, 2 and 3 Kw loadings with or without Automatic Heat Control. From **£8.17.7**

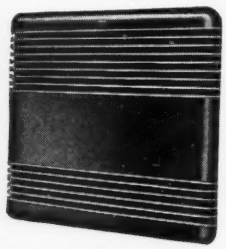


1 Kw FR Heater
Floor-standing model with walnut finish plastic front panel and warm luminous effect behind 'old gold' metal grilles. With or without Automatic Heat Control. **From £9.11.3**

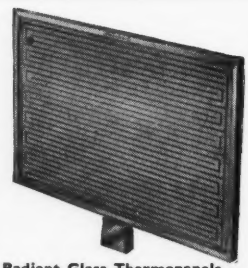
2 Kw FR Heater
Larger version of the attractively styled floor-standing heater. Available with or without Automatic Heat Control. From **£14.6.10**

Thermotubes
Tubular heaters in lengths from 2 ft. to 12 ft. giving a flexibility of installation to meet the most difficult heating problems. From **£1.0.6**
Waterproof types also available.

1 Kw Inset Heater
Inset type heater for building into walls and furniture. Front panels in walnut plastic, with grilles coloured 'old gold.' With or without Automatic Heat Control. From **£10.4.11**



2 Kw Inset Heater
Attractively styled 2 Kw version of the Inset type for large area heating. Available with or without Automatic Heat Control. From **£14.13.8**



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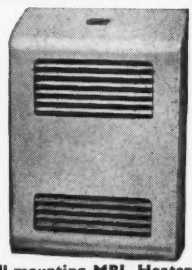
Wall-mounted heaters for rapid local heating. 750w and 1 Kw loadings in two types: type RG for industrial applications, type RGF with wall frame for use where appearance is important. From **£8.17.7**



Wall-mounting MRL Heaters
Robustly constructed of welded sheet steel for compact wall-mounting. Ideal for all applications where floor space must be kept clear. Available in 750w, 1 Kw, 1500w and 2 Kw loadings, with or without Thermostat Control. From **£10.4.11**

The first cold spells of Autumn send up the demand for Thermovent Heating—NOW is the time to prepare! The widely extended range of Thermovent Heating Equipment includes **high temperature panels, unit heaters** and a range of **thermostats** for every type of installation. ORDER THERMOVENT HEATING NOW AND CASH IN ON AUTUMN SALES

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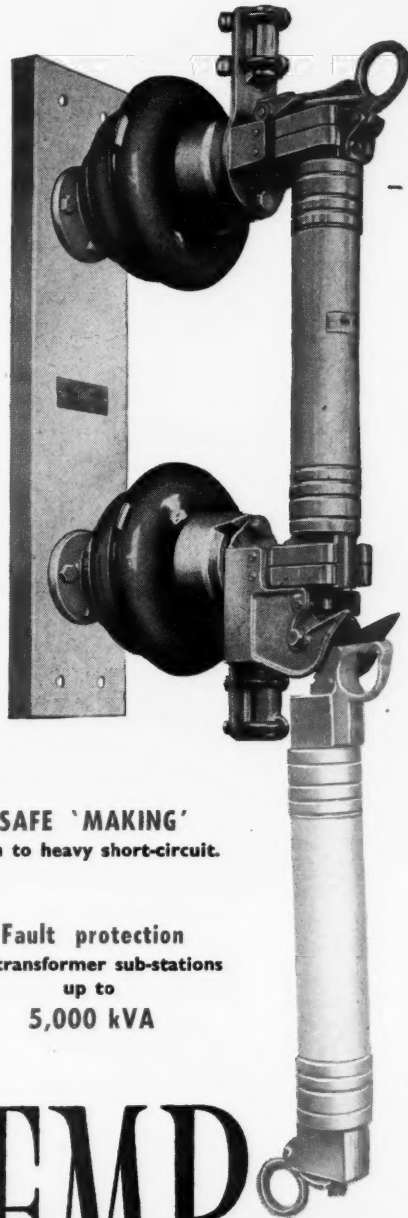

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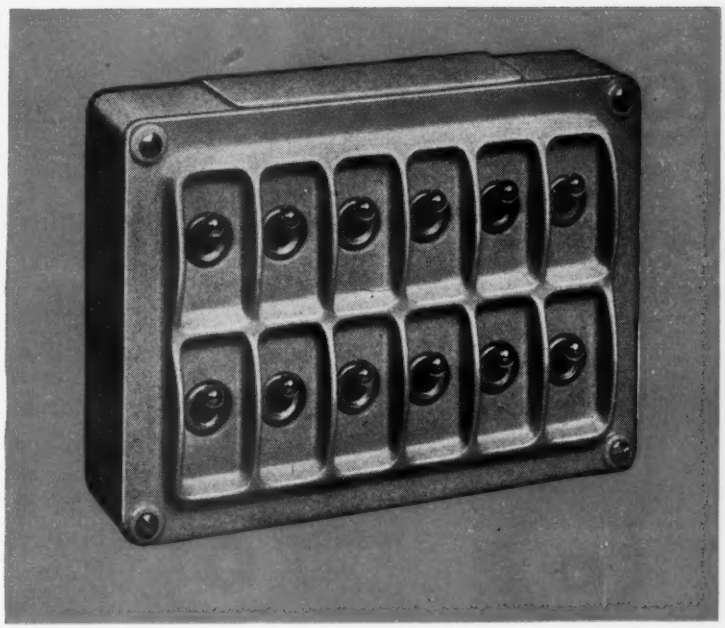

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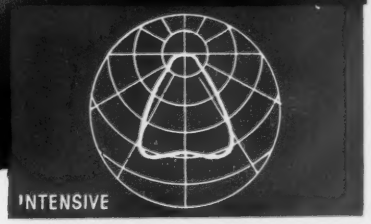
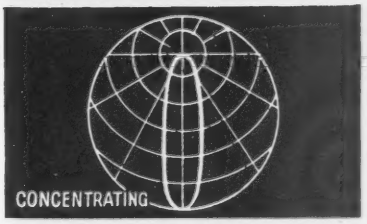
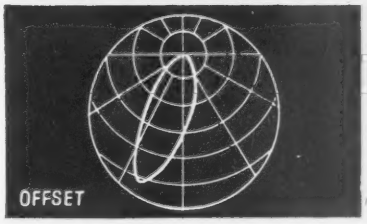
ARCHITECTURAL SCHEMES

A New Lighting Approach







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R.E.A.L. STANDARD PLINTH LIGHT

List No. 5000

		Price
Diameter at Top	8″	**36/9d.**
Diameter at Base...	11½″	each.
Overall Height	2⅞″	
To accommodate 15 watt, or 25 watt B.C. Lamp.		Tax Paid.

R.E.A.L. JUNIOR PLINTH LIGHT

List No. 5002

		Price
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Diameter at Base...	6½″	each.
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To accommodate 15 watt B.C. Pygmy Lamp, or 25 watt B.C. Tubular Lamp.		Tax Paid.

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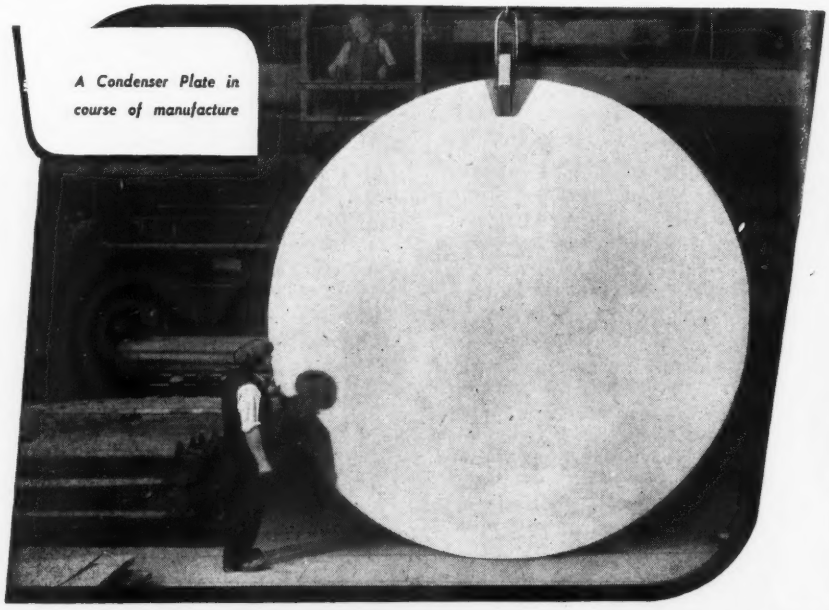

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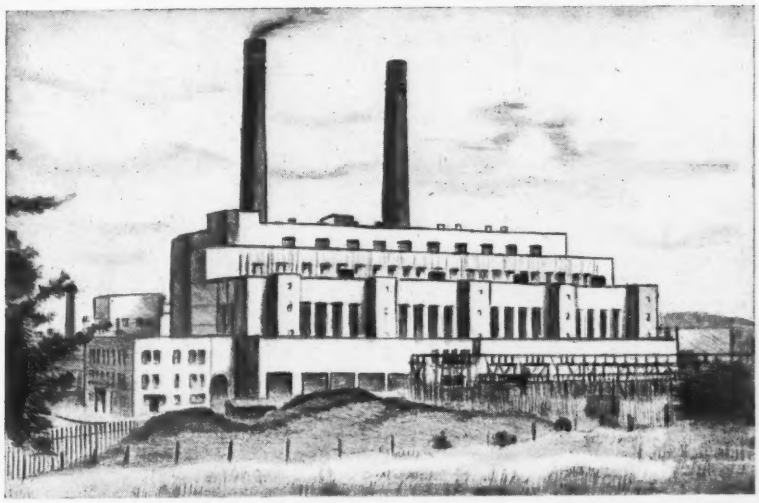

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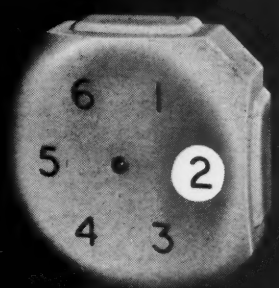

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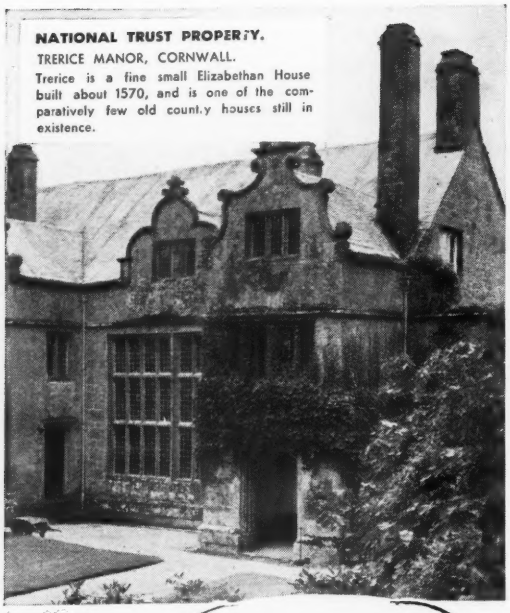
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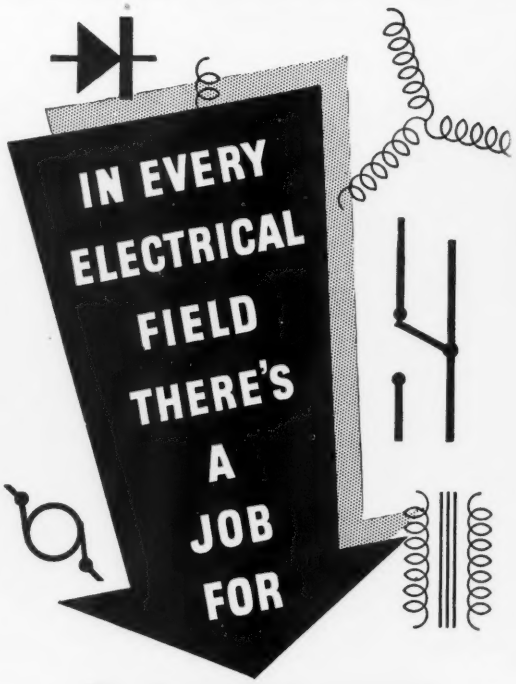

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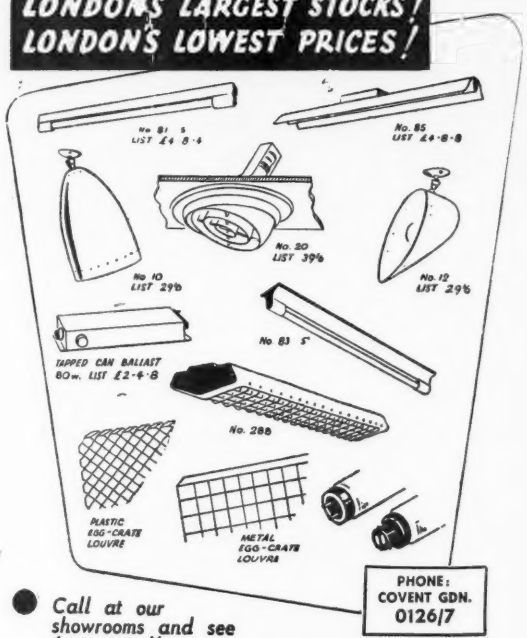

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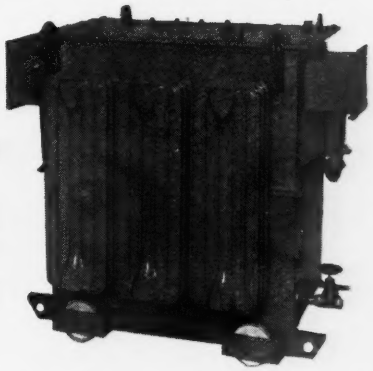

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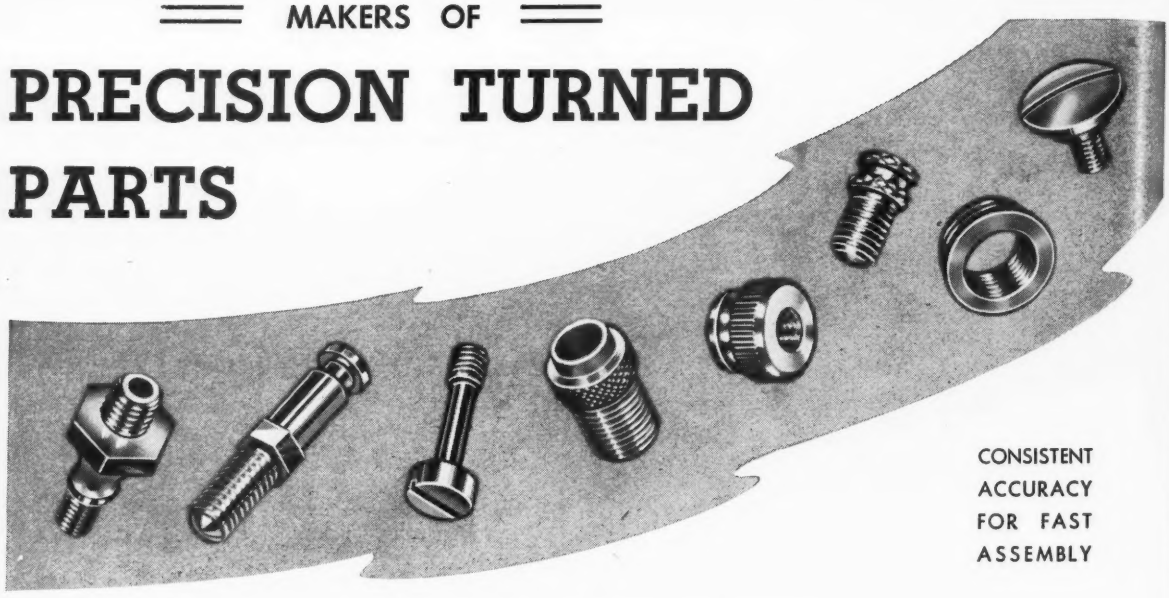

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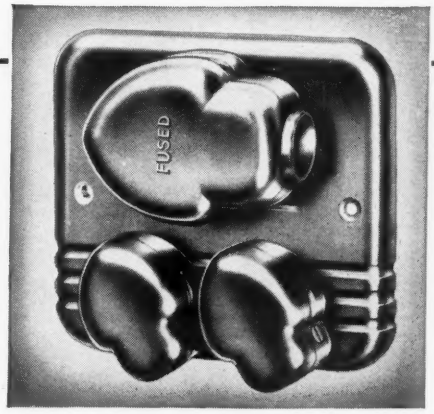

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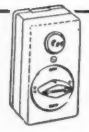
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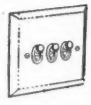
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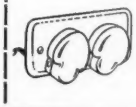
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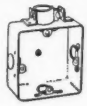
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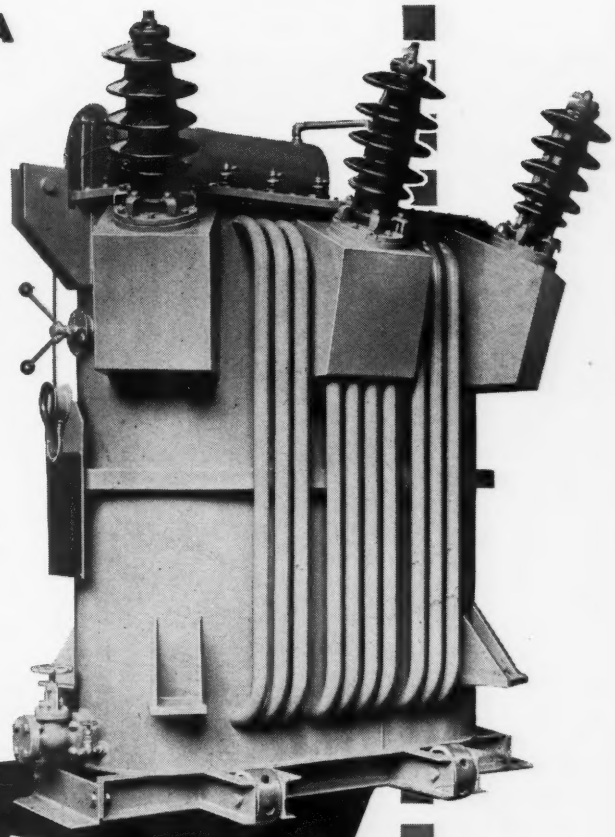

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Contactors are fitted to a machine to automatically reverse the 25 h.p. motor when certain conditions arise. It is a heavy, arduous duty and before G.W.B. Contactors were fitted it was necessary to carry out the following maintenance.

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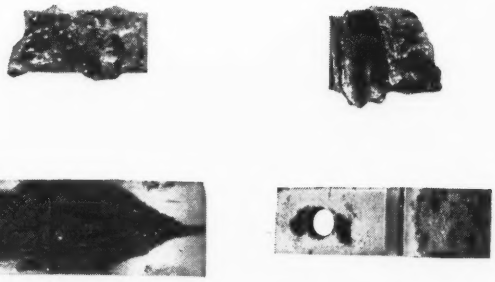
There are many refinements incorporated in the design of G.W.B. Contactors and these have been described in a booklet. One of the most important features is the sintered tungsten and silver contacts. The required metal combination has been made possible by a unique metallurgical technique developed by our Italian associated company, O.M.R. The advantage of this metal combination is that the tungsten is resistant to high temperature conditions, while the silver has excellent conductivity characteristics. When the contact faces are closed, there is a multitude of 'spot' contacts so allowing a short clean break between contacts. instead of the protracted arcing commonly associated with conventional types. The photograph on the right shows a set of copper contacts after one month arduous industrial duty. Below are a pair of G.W.B. contacts, after having fulfilled the same duty, at the end of six months.



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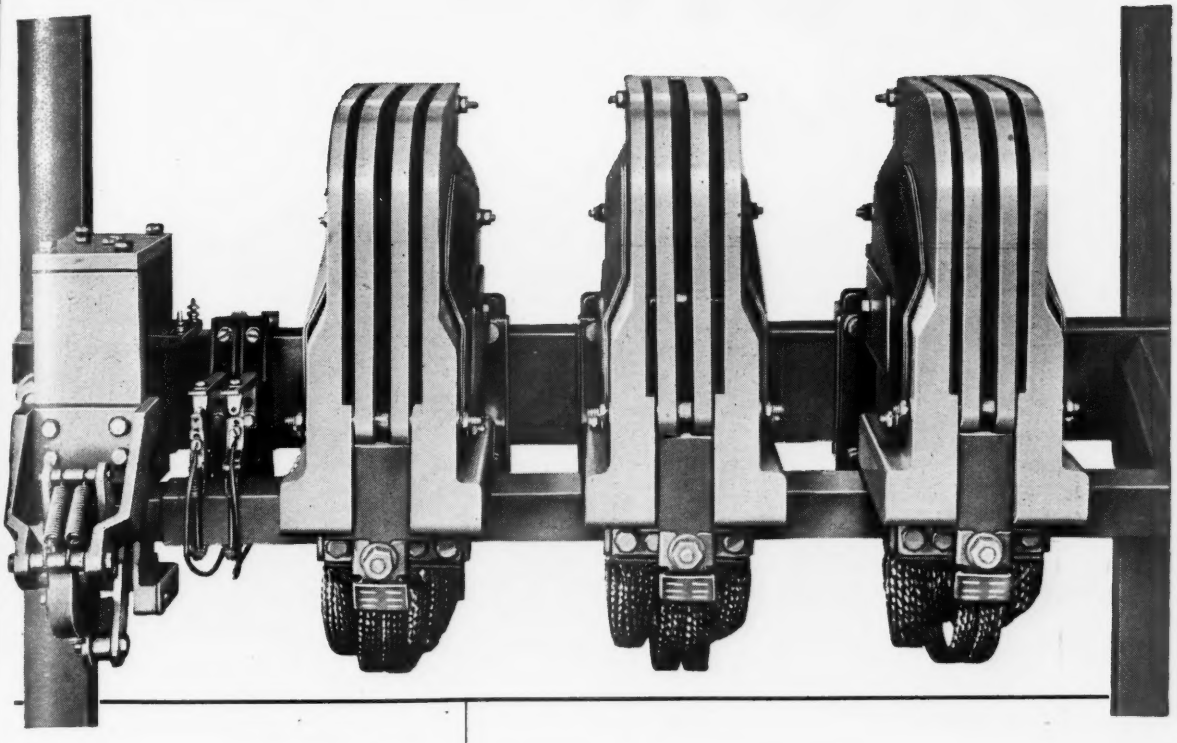

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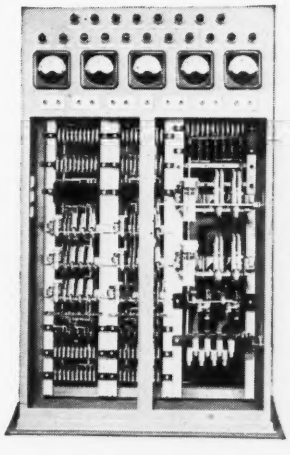

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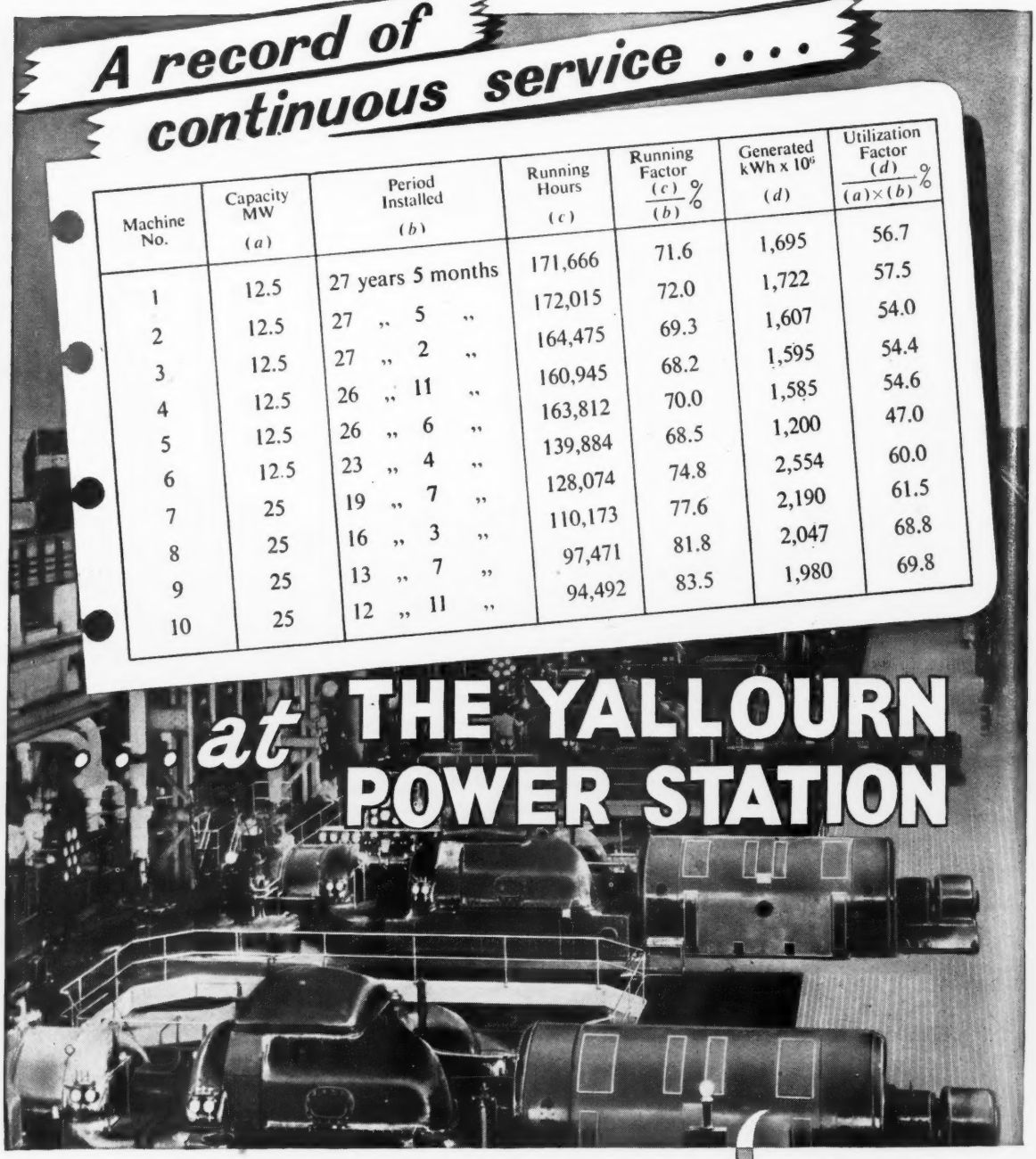
A record of continuous service ....

Machine No.	Capacity MW (a)	Period Installed (b)	Running Hours (c)	Running Factor (c)/(b) %	Generated kWh x 10^6 (d)	Utilization Factor (d)/(a)×(b) %
1	12.5	27 years 5 months	171,666	71.6	1,695	56.7
2	12.5	27 „ 5 „	172,015	72.0	1,722	57.5
3	12.5	27 „ 2 „	164,475	69.3	1,607	54.0
4	12.5	26 „ 11 „	160,945	68.2	1,595	54.4
5	12.5	26 „ 6 „	163,812	70.0	1,585	54.6
6	12.5	23 „ 4 „	139,884	68.5	1,200	47.0
7	25	19 „ 7 „	128,074	74.8	2,554	60.0
8	25	16 „ 3 „	110,173	77.6	2,190	61.5
9	25	13 „ 7 „	97,471	81.8	2,047	68.8
10	25	12 „ 11 „	94,492	83.5	1,980	69.8



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The table above shows the record of service given by Metropolitan-Vickers Turbo-Generators installed at the YALLOURN POWER STATION of the State Electricity Commission of Victoria, Australia.

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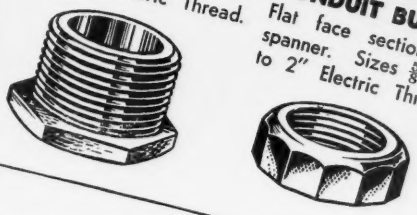
Hexagon section for spanner. Sizes $\frac{5}{8}$" up to 2" Electric Thread.

Flat face section for spanner. Sizes $\frac{5}{8}$" up to 2" Electric Thread.



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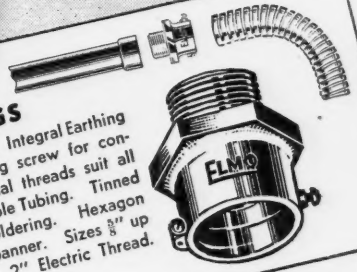

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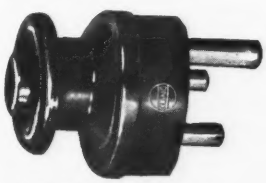

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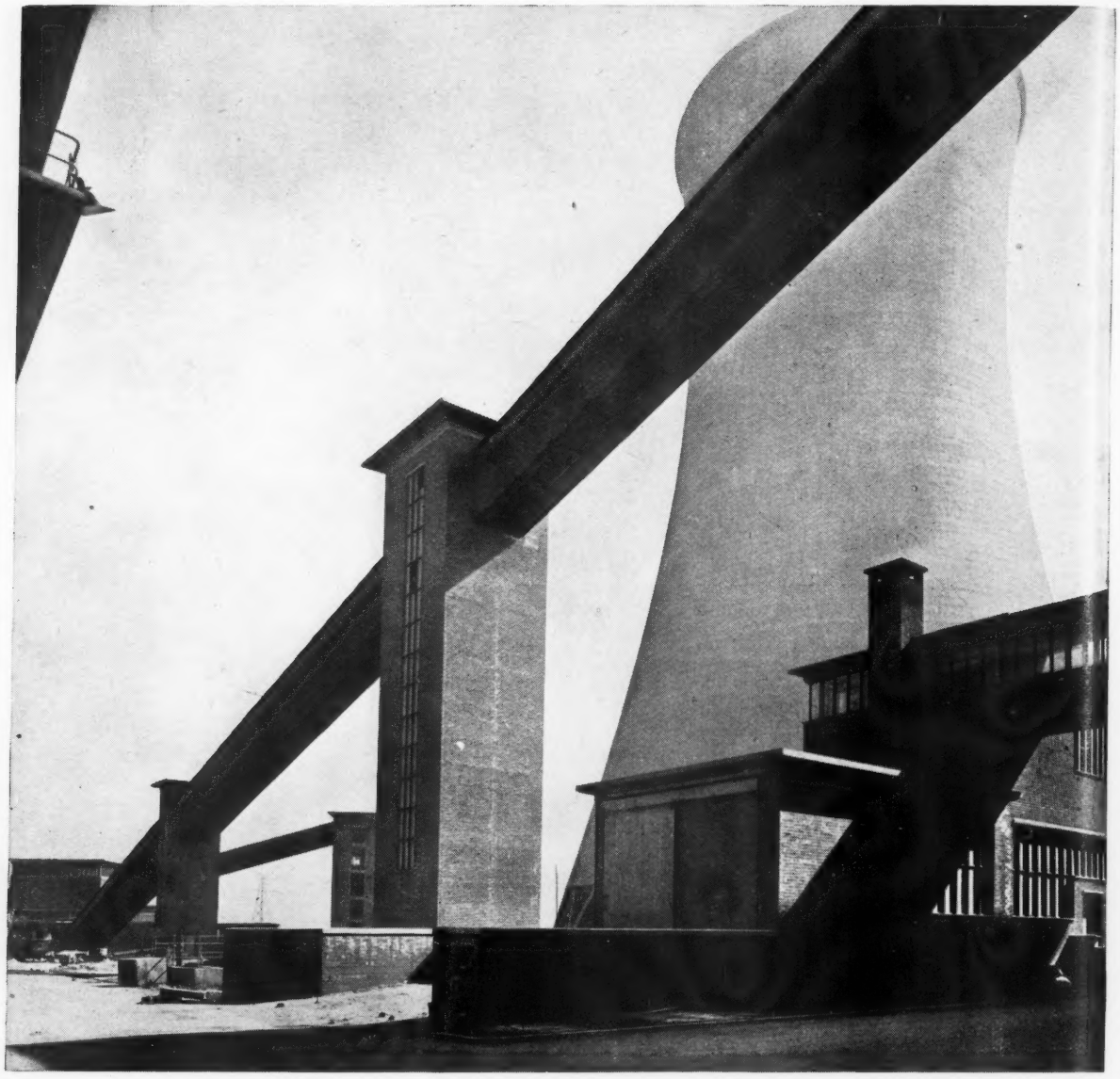

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ELECTRICAL REVIEW

Managing Editor: HUGH S. POCOCK, M.I.E.E.
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1 OCTOBER 1954

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VOLUME 155 ✧ NUMBER 14

Eighty-Second Year of Publication

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136 INDEX TO ADVERTISERS

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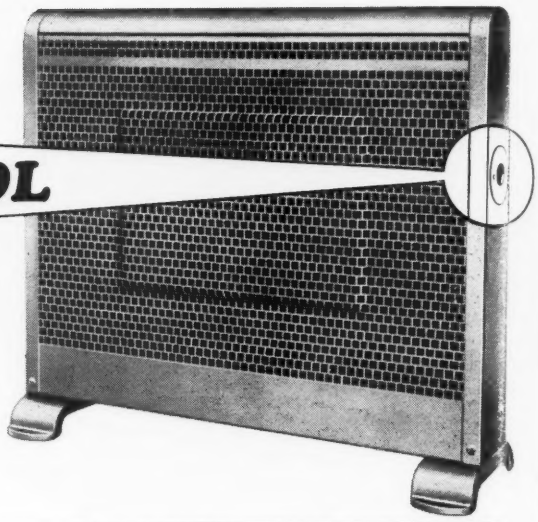
RAYDAIR Heater



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ELECTRICAL REVIEW

1 October 1954 Vol. 155 No. 14 Established 1872

Electricity Supply Progress

THE tendency to take for granted an advance each year in every aspect of public electricity supply receives further encouragement from the report for 1953–54 of the British Electricity Authority reviewed in this issue. The capacity of new generating plant installed nearly equalled that of the preceding year and sufficed to get us through the winter almost free from power cuts, but the weather was relatively mild at the time of the December and January peaks. To this happier condition a continued improvement in the overhauling schedule made a valuable contribution.

The impact of new generating plant is seen in a further increase in power station thermal efficiency as a whole, which saved more than a million tons of coal. For the first time in this country and, we believe, anywhere outside the United States, a yearly overall efficiency exceeding 30 per cent has been achieved (and by three stations, to give good measure). Even better figures are likely when the more advanced designs foreshadowed in the report come into operation later. This improvement unfortunately cannot bring corresponding benefit to consumers of electricity, since the economies effected are more than offset by rising costs of fuel.

Last year was also notable for such further developments as the building of the first nuclear power station, the putting into commission at 275 kV of initial sections of the supergrid and for promising results of experimental work relating to the proposals for interconnecting the British grid with the French high-voltage transmission system.

Further progress in the supply of electricity is recorded in the report; all classes of consumption increased with the lamentable exception of street traction. The advance was most marked in rural areas and provision is being made for its continuance at an even greater rate.

The increase of 6·9 per cent in the sale of electricity in 1953–54 compares with 3·7 per cent in the preceding year and 8·2 per cent in 1951–52. A total of 55,800 million kWh was sold; it is estimated that by 1959–60 the annual figure will have reached 80,500 million kWh. This will necessitate plant capable of sending out 90,500 million kWh a year and by that time the total capital expenditure since vesting day (1st April, 1948) will have risen to £2,121 million of which £1,494 million will represent " new " money raised by borrowing.

The surplus of £13·2 million resulting from the system's operation in 1953–54 is a large sum, but it represents only about 4 per cent on the " turnover " of £326·5 million. Last year only two Boards incurred losses against six the year before, but the South Western Board was " saved " by a subvention from the central reserve fund.

Although the price of the unit went up by nearly 5 per cent, and despite complaints of excessive charges, electricity remained cheap at the price. Nevertheless the Central Authority and Boards must continue to maintain the closest watch on costs and do all that they can to improve the load factor to keep the price from rising further.

RAILWAY ELECTRIFICATION

Parallel with our last week's leading article on railway electrification a letter on the same subject from Mr. G. Nabarro, M.P., appeared in the *Daily Telegraph*. Mr. Nabarro has not always been so "electrically-minded" as we would have liked, but he has shown before that he is wholeheartedly in favour of electrifying the railways. His arguments are familiar to our readers but need constant repetition if they are to have effect. First, of course, comes the point of coal conservation—the tremendous saving of the coal burned and the fact that power stations use inferior grades. Next Mr. Nabarro mentions the improvement, by diversity, of the power stations' load factor, a matter of general benefit. He further reminds his readers that the coming of atomic energy will inevitably mean its distribution electrically. He concludes by repeating what we have often said: although railway electrification will be costly the benefits are such that the expenditure upon it will be fully justified and it should be given precedence among the competing claims for capital investment.

SURVEY OF PROSPECTS

Sir Harry Railing's speech at the annual meeting of the General Electric Company was a compound of hope and apprehension. In the home market the past year has seen a change for the better thanks to the relief of domestic appliances from the double handicap of discouragement and hire-purchase restrictions. A continuing demand for plant from the British Electricity Authority is anticipated and the National Coal Board, and Sir Harry even expects more business from the railways, although there the pace is too slow. Surveying export trade, Sir Harry is not so optimistic. The resurgence of Germany to join other competitors in world markets gives cause for some concern, particularly as German taxation, for various reasons, is lighter than ours and wages are substantially below those in this country. Labour costs in the electrical industry form the bulk of the total costs and any increases have a correspondingly serious effect upon our competitive ability. That is not to say that higher wages are impossible; they can be afforded if they are spread over greater output per employee. This fact is recognized by responsible trade union leaders. We can only hope that the rank and file will see it too and not be swayed by those whose aims are political rather than in the workers' ultimate interests.

IMPROVISATION

During our visits to all manner of factories and works we frequently come across modifications made to standard electrical equipment, sometimes merely to satisfy the predilections of the works electrical engineer or works manager, etc., but more often to meet the needs peculiar to local conditions. Quite often our attention is drawn to these alterations—perhaps to a cable junction box to facilitate circuit splitting, or to a motor control unit to meet conditions imposed by a complicated electric drive—by the works engineer who is responsible for the modification, with signs of embarrassment or even of guilt. There is certainly no need for such feelings, for standard equipment cannot be made entirely to meet every possible exigency. We are quite sure that the equipment manufacturers would nearly always welcome news of such modifications where they obviously improve the local conditions, and we reiterate that we always welcome such news for publication for the benefit of many classes of our readers.

FOG ANALYSIS

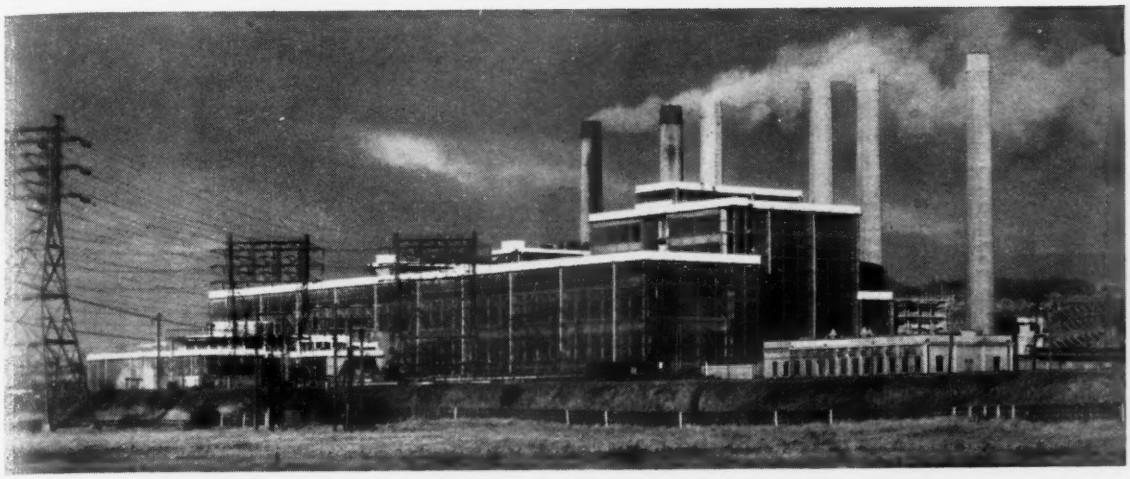
Doubt has been cast upon the theory put forward in the recent Ministry of Health report (see our issue of 27th August) which attributed the ill effects of the London fog of December, 1952, mainly to sulphur dioxide in the atmosphere. Investigations by Mr. W. C. L. Hemeon of the Mellon Institute of Pittsburgh (U.S.A.), reported in *The Times*, showed that about 20 per cent of the fog particles from Donora (Pennsylvania), where a disastrous fog occurred six years ago, would dissolve in water and that 58 per cent of this soluble matter contained metallic ammonium sulphate. Soluble particles from London were composed mainly of ammonium chloride and calcium sulphate with traces of sodium, potassium and other salts. Simple irritation of the breathing apparatus of susceptible persons rather than poisoning by sulphur dioxide and other gases would, according to this finding, seem to be responsible for the trouble.

POWER STATION CONSTRUCTION COSTS

The recent spate of power station opening ceremonies has given rise to some speculations on the likely saving in construction costs for outdoor and semi-outdoor stations as against the fully enclosed type of station, and in the construction of lighter type of building as against the, say, brick and/or concrete walled building. The "outdoor" power station is at the moment purely in the experimental stage both in this country and in America and we do not propose here to discuss its respective merits and demerits, which were dealt with largely in an I.E.E. paper last session. We are, however, most anxious to dispel any extravagant claims as to savings in the civil engineering costs on account of the power station building which must necessarily be a very small proportion of the total civil engineering costs for the station. In saying this, however, we do not suggest that the saving of the small proportion is not worth while.

DOMESTIC ISSUE

The annual Special Domestic Issue of the "Electrical Review" is to be published on 15th October. It will contain a survey of the trend of design and development in all classes of household electrical appliances and articles on domestic electrification.



Dunston "B2" power station, eastern end

British Electricity Supply

The B.E.A.'s Annual Report for 1953-54

THE Sixth Report and Statement of Accounts of the British Electricity Authority, which was published on Tuesday (H.M. Stationery Office, price 9s.), covers the twelve months ended 31st March of this year. It records that the 66,107 million kWh generated at the stations owned by the Authority during that period represented an increase of 7·3 per cent over the figure for 1952-53, and that the thermal efficiency of all power stations based on kWh sent out advanced to 23·4 per cent from 22·72 per cent, with a consequent saving of 1·1 million tons of coal valued at £3·5 million.

Further particulars of the present position compared with that of the previous year are given in the accompanying Tables 1 and 2. Steam power stations produced 99·21 per cent of the total kWh generated. The remainder came from other sources in the percentages stated: Water power, 0·63; waste heat, 0·09; internal-combustion engines, 0·07.

Steam stations heading the list of those returning the highest thermal efficiencies were: Portobello, high pressure section, Edinburgh (30·93 per cent); Stourport "B," Worcestershire (30·53 per cent); and Dunston "B2," Newcastle-upon-Tyne (30·21 per cent). The first twenty in this respect, which were responsible for nearly one quarter of the national output, had an average thermal efficiency of 28·45 per cent compared with 27·09 in the corresponding period of 1952-53. Eight new stations of advanced design and high steam conditions, which have not yet been in operation for a full year, are excluded from the comparison. These stations with their initial MW capacities (sent out) are: Bold "A," St. Helens, 28; Carmarthen Bay, Burry Port, 100; Carrington, near Manchester, 56; Chadderton, Oldham, 35; Connah's Quay, near Flint, 56; Doncaster "B," 28; East Yelland, near Barnstaple, 56; Roosecote, Barrow, 56. The experimental 15 MW gas turbine at Trafford power station, Manchester, is disregarded in this year's statistics.

Over 17 per cent of the steam-driven generator capacity and 14 per cent of the boiler capacity were 25 years old or more. An average loss of capacity of 12·4 per cent of the total MW installed was experienced during December and January, the usual peak months (compared with 13·6

TABLE 1. GENERATION STATISTICS: ALL B.E.A. STATIONS

Position at 31st March	1953	1954
Power stations in operation, number	285	288
Installed capacity, MW	17,157	18,647
Maximum output capacity, MW (a)	15,535	16,904
Power stations planned or under construction:		
New power stations, number	34	35
Extensions to existing power stations, number	52	57
Capacity of plant, MW	9,441	11,106(b)
During the years	**1952-53**	**1953-54**
Electricity generated, million kWh	61,603	66,107
Electricity sent out, million kWh	57,951	62,121
New power stations commissioned, number	7	8
Existing power stations extended, number	28	23
Installed capacity of new plant, MW	1,423	1,419
Plant shut down, MW	95	32
Maximum demand met, MW	13,547	15,430
Estimated potential demand, MW	14,850	16,309
Plant deficiency, MW (c)	1,549	879
Plant not available at peak, per cent (d)	13·6	12·4

(a) Installed capacity less that required for station auxiliaries and on account of limitations imposed by technical considerations.
(b) To be installed by end of 1959.
(c) Shortage of plant available at times of maximum potential demand, as reduced by load spreading. In extremely cold weather, and without load spreading, the estimated plant deficiency was 1,650 MW in 1947–48, 2,400 MW in 1952–53 and 2,200 MW in 1953–54.
(d) Percentage of maximum output capacity.

TABLE 2. STEAM POWER STATIONS: TECHNICAL DETAILS AND COSTS

	1952-53	1953-54
Technical Details		
Steam power stations, number	209	212
Effective output capacity, MW	15,302	16,674
Electricity generated, million kWh	61,174	65,587
Electricity sent out, million kWh	57,528	61,608
Coal burned, million tons	34·6	36·15
Coal pulverized, per cent	35·31	41·86
Coal, calorific value, B.Th.U./lb	10,867	10,783
Coal, lb per kWh sent out	1·384	1·352
Heat rate, B.Th.U. per kWh sent out	15,016	14,580
Thermal efficiency, sent out, per cent	22·72	23·4
Works Costs		
Total, d/kWh	0·5446	0·5594
Fuel, including transport, d/kWh	0·4387	0·4553
Fuel handling, etc., d/kWh*	0·0245	0·0247
Operation salaries and wages, d/kWh	0·0356	0·0358
Oil, water and stores, d/kWh	0·0039	0·0037
Repairs and maintenance, d/kWh	0·0419	0·0399
Coal cost (excluding handling), d/ton	715·0	758
Fuel handling, d/ton	39·7	41
Employees		
Technical and supervisory	4,348	4,593
Operation	17,031	17,383
Repairs and maintenance	13,349	13,301
Total per MW output	2·36	2·20

* Includes also pulverizing, ash handling and disposal, and flue gas treatment.

per cent in the previous year), the causes being breakdown 7·5, overhaul 2·5 and miscellaneous 2·4 per cent. Load disconnection was necessary on one occasion only as against nine in 1952-53. Steps taken to expedite plant overhaul reduced loss of capacity in March and April and in October and November by the equivalent of 680 MW (sent out).

Fuel consumed in the B.E.A. stations amounted to 37·25 million tons, made up of coal 36·15 million (including 5·7 million open-cast), coke 0·94 million and oil and other fuels 0·16 million. Screenings from imported coal amounted to 0·1 million tons. About 21 million tons was transported by rail and 10 million tons by the Authority's fleet of 47 sea-going colliers and by other vessels on charter. The average price paid for coal delivered into bunkers rose during the year by 6·2 per cent. Fuel accounted for 81 per cent of works cost which were increased by 2·7 per cent. Costs of repairs and maintenance fell by 4·8 per cent and salaries and wages rose by 0·6 per cent.

Load spreading was not necessary in England and Wales. The maximum potential demand of 16,309 MW occurred on Tuesday, 2nd February, when the demand was reduced by 879 MW by lowering frequency and voltage. The load factor over the year, based on potential demand, was 43·8 per cent. Disconnection of supply was necessitated on only one occasion, but had the weather been extremely cold in December, the plant shortage would have amounted to 2,400 MW.

The plant programme of 1,830 MW for 1959, which was approved during the year, provided for only 680 MW in sets of 60 MW and under, the remainder comprising four 100 MW sets, five of 120 MW and one of 200 MW. For the last named, which will be located near Tuxford, turbine steam conditions are to be 2,350 lb/sq in and 1,050 deg F with reheat to 1,000 deg F.

Ten schemes for district heating and supply of steam to industry were under investigation. During the second year of operation of the Pimlico scheme, the heat sent out from Battersea power station averaged 680 therms per flat. From the evidence available, the washing of flue gases is held to be justified only if acute national shortage

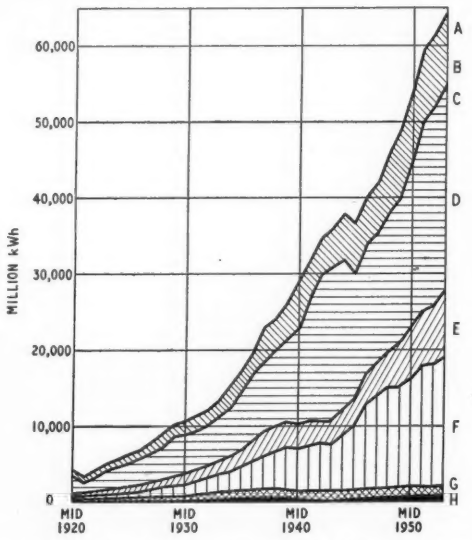


Fig. 1.—Growth of public electricity supply in Great Britain, excluding North of Scotland. A.—kWh generated. B.—kWh used in power stations, and in transmission and distribution. C.—Total kWh sold to consumers. D.—To industry. E.—To commercial premises. F.—Domestic and farm purposes. G.—Sales for traction. H.—Public lighting

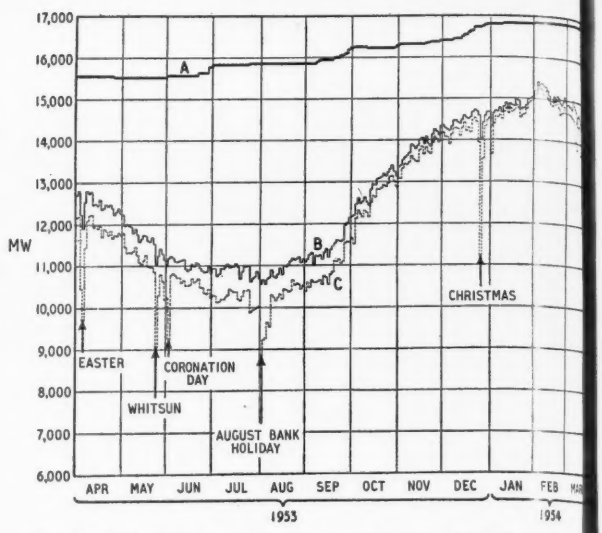


Fig. 2.—Plant capacity and system demand. A.—Maximum output capacity with all plant in service. B.—Available output capacity after allowing for losses due to breakdown, overhaul and other generating plant limitations. C.—Output capacity as in B less capacity unused because of local circuit limitations within grid control areas. The MW capacity corresponding to 634 million kWh purchased from outside sources is ignored

of sulphur requires its uneconomic recovery, concerning which enquiries are proceeding. Otherwise the cooling to 80 deg F of the gases discharged normally at about 260 deg F causes them to fall to the ground, destroying much of the advantage of chimneys at least 300 ft tall. At Battersea £1·5 million has been expended on the plant and the cost of the washing process is equivalent to 8s to 10s per ton of coal burnt. Gas-washing plant is believed to be installed only at Battersea and Bankside among the world's power stations.

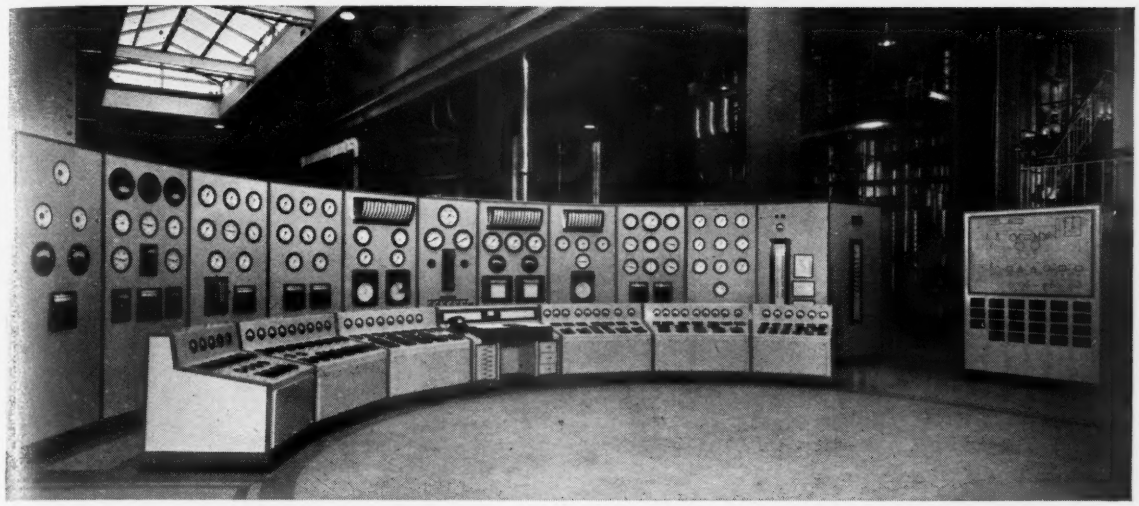
Fine ash from pulverized-fuel furnaces is expected to provide a good raw material for burnt bricks (85 per cent ash and 15 per cent plastic clay) and partly to replace 20 per cent of cement in concrete. The capital expenditure on grit arresting plant for new power stations amounts to about £3 million/annum, and will be £0·1 to £0·3 for each of a number of existing stations. Mechanical arrestors are being used for mechanical stokers and electrostatic precipitators for pulverized-fuel firing.

Major works put in hand for the grid included: 16 route miles of 275 kV lines and 224 miles at 132 kV; 240 MVA of 275 kV transformers and 2,140 MVA of 132 kV transformers; and thirty 132 kV circuit breakers. Of the £20 million of main transmission contracts placed during the period under review, £6·5 million related to the 275 kV supergrid. The mileage of main transmission lines and cables at 31st March last is given in Table 3.

Only 0·7 per cent of the insulator units tested were found to be faulty. A total of 139 miles of overhead

TABLE 3. MAIN TRANSMISSION SYSTEM

In Commission at 31st March	1953	1954
Overhead lines, route miles:		
275 kV	—	41
132 kV	4,107	4,537
66 kV and below	140	133
Underground cables, route miles:		
275 kV	—	—
132 kV	67	78
66 kV and below	368	366
Grid substations, number	299	323
Transformed capacity, MVA:		
275 kV	—	240
132 kV	16,766	18,848
66 kV and below	2,173	2,113



Bailey central control board for both boiler and turbine at Stourport "B" power station. Boiler visible in background

conductors were renewed because of corrosion. There were 468 system faults, 86 per cent being correctly cleared.

New grid supply points numbered 16, saving £1·7 million over costs incurred by developing existing points of supply to individual undertakings, bringing the total capital saving to the Authority and Area Boards since vesting day up to £10·2 million.

In an account of the tests on the 132 kV 100 MW power cables for interconnection with the French transmission system (which have been previously described in the *Electrical Review*), reference is made to attempts to use under-water television to view the cable and joints; these were unsuccessful largely owing to difficulties of illumination and focusing. Tests on existing submarine cables across the Solent showed that d.c. if ultimately used for the Channel crossing would cause no material disturbance to a ship's magnetic compass. Apart from short runs of 132 kV cables for power station connections 3½ route miles of 90 MVA pre-impregnated gas pressure cables and 1½ route miles of 90 MVA oil-filled cables were laid at that voltage. An order has been placed for a trial length of 300 yd of 66 kV 120 MVA aluminium-sheathed single-core oil-filled cables laid in trefoil formation.

The B.E.A.'s first 132 kV single-circuit wood pole overhead line, 27 miles from Carmarthen Bay to Haverford West, was erected; this construction is unearthed, the insulation of the wood dealing with lightning. Other similar lines are being designed. Satisfactory type tests were made on new designs of carrier-current wave traps (800 to 1,200 A) for 132 kV and 275 kV and of a new design of 132 kV fault-throwing switch. In trials of coals of differing chlorine, ash and sulphur content, it was found that fouling did not arise in boilers fired by pulverized fuel until the chlorine content exceeded 0·6 per cent.

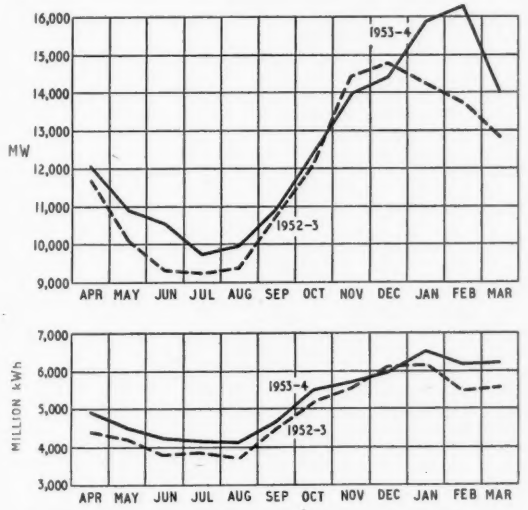


Fig. 3.—Monthly maximum potential demand (half-hourly) and monthly output of B.E.A. power stations including allowance for low frequency, voltage reduction or disconnection of supply

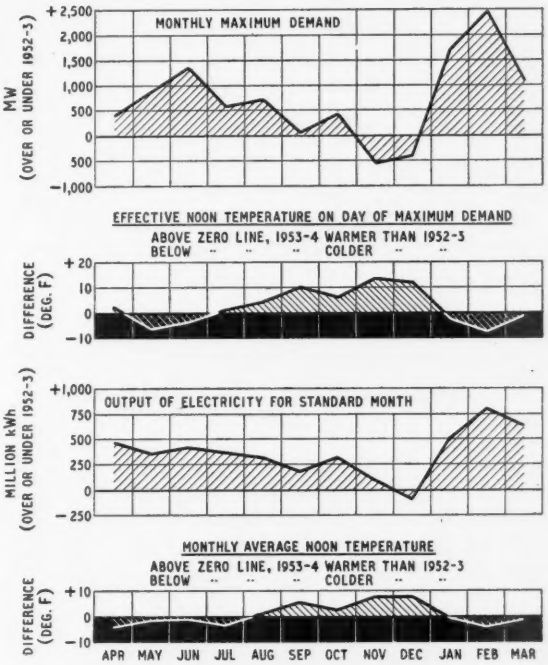


Fig. 4.—Load and weather differences between 1952-53 and 1953-54. The monthly maximum demand is the average (whether wholly supplied or not) on B.E.A. stations over the half-hour of highest demand in each month

The B.E.A. has set up an engineering branch to design and eventually to arrange for the construction of nuclear power stations as made feasible by research and development of the new Atomic Energy Authority, to which B.E.A. engineers will be seconded. It is hoped that within the next few years the B.E.A. will be in a position to begin the construction of large base-load nuclear stations containing 60 MW sets or larger, as part of its normal activities. Information at present available indicates that, in the long term, electricity produced from nuclear fuel (the reactor and heat exchanger taking the place of the boiler) may be competitive in price with that produced from coal.

Increased Sales

There was an increase of 3·8 per cent in the number of consumers during the year, raising the total to 14·38 million. Sales of electricity by the Electricity Boards rose by 6·9 per cent to over 55,800 million kWh. The figures for the individual Boards are set out in Table 4.

Table 5 shows how the sales were divided among the various classes of consumers. Once again the greatest increase was registered for farms, although the advance (15·8 per cent) was not proportionately so great as in 1952–53 (18·2 per cent). It will be seen that roughly half the sales were industrial, a third domestic and a seventh commercial. There was a satisfactory increase in industrial sales (9·8 per cent) reflecting a high rate of industrial activity during the year. Traction sales as a whole were practically the same, a rise of 2·4 per cent in railway supplies being cancelled out by a 4·5 per cent decrease in street traction. Discussions with the British Transport Commission about supplies for further railway electrification were started during the year. Domestic sales were somewhat lower than they might have been on account of the mild winter.

The improvement in rural supplies is evidenced by the increase in the South Western Board's sales of 10·1 per cent—the greatest of the Boards' rises. The London Board's sales advanced by only 3·7 per cent.

A revised bulk supply tariff was prepared to operate from 1st April, 1954; it is estimated that this will result in an overall increase of 1 per cent, although the effect on individual Boards will vary.

Thirteen Boards have now published standard domestic tariffs, ten Boards have produced standard general commercial tariffs, nine standard industrial tariffs and ten standard farm tariffs. The Boards are giving attention to special terms for off-peak supplies and seven of them have published tariffs for the purpose; other Boards are prepared to offer special terms under individual agreements.

TABLE 5. CONSUMERS AND SALES

Class	No. of Consumers 31.3.54	Per cent inc. or dec. on 1952-53	Sales of Electricity 1953-54 Million kWh	Per cent inc. or dec. on 1952-53
Industrial	159,875	+2·0	28,454	+ 9·8
Commercial* ...	1,408,789	+1·9	7,917	+ 5·8
Domestic* ...	12,658,519	+4·0	16,761	+ 2·9
Farm	152,507	+9·3	779	+15·8
Traction:				
Rail	68	−2·9	955	+ 2·4
Street			446	− 4·5
Public lighting ...	3,956	+4·9	534	+ 7·4
Totals	14,383,714	+3·8	55,846	+ 6·9

*Including combined domestic and commercial supplies

Under the heading "National Fuel and Power Policy" the report refers to the National Industrial Fuel Efficiency Service to which the B.E.A. is contributing £100,000 a year for the first five years—a contract undertaken with reluctance, the Authority being of the opinion that the major proportion of the funds should be subscribed by the industrialists who will be the major beneficiaries.

Extensive rural electrification work is in hand and in prospect. During the five years ending 31st March, 1958, it is planned to connect 60,000 additional farms and 260,000 other rural premises at a cost of £50 million. A similar amount is to be spent over the next five years in supplying a further 45,000 farms and a corresponding number of houses and other premises. To this expenditure of £100 million will be added £30 million for associated increases in generating capacity and the main transmission system. By 1963, it is thought, about 85 per cent of all farms and a higher proportion of other rural premises should have supplies; the remaining 15 per cent present a difficult problem requiring special consideration.

Although rural consumers are asked to contribute to the cost of supplying them, revenue is still insufficient in the earlier years to cover costs. The only solution is a fuller use of the service and much is being done to promote this.

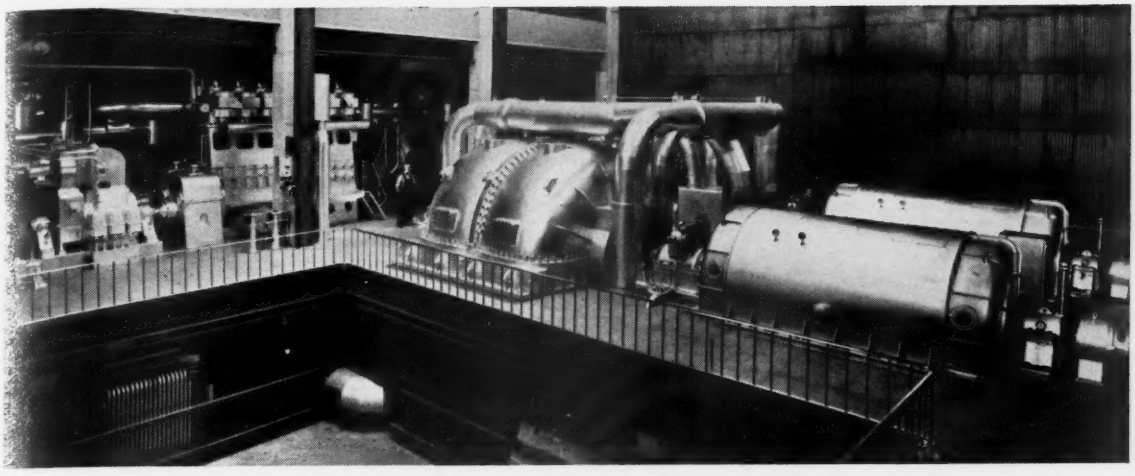
The Authority and Boards have continued to assist in the work of standardization of electrical appliances and accessories and a number of matters dealt with under this head are referred to. There is also a mention of the list of technically-approved domestic appliances issued by the British Electrical Development Association.

Proposals for the establishment of a National Inspection Council for Electrical Installation Contracting were the subject of continuing discussion and it is hoped that definite progress will be made in the near future. The removal of hire-purchase restrictions and reduction of purchase tax have led to increased sales of water heaters. It is hoped that further tax alleviation may soon be possible

TABLE 4. ANALYSIS OF ELECTRICITY BOARDS SALES

Board	Population at 30.6.53 (Thous.)	No. of consumers (Thous.)	Sales of Electricity (Thousands of kWh)							
			Domestic	Farm	Commercial	Industrial	Public Lighting	Traction	Total (excl. inter-Board sales)	Inc. over 1952-53 Per cent
London	5,096	1,675	2,009,304	414	1,510,574	1,362,521	97,427	87,077	5,067,317	3·7
S. Eastern	3,252	1,052	1,504,069	55,945	507,045	910,908	35,643	19,786	3,033,396	6·6
Southern	3,826	1,117	1,433,744	107,373	696,867	1,343,029	28,846	16,097	3,625,956	7·3
S. Western	2,131	648	742,646	55,911	333,133	592,440	18,520	—	1,742,650	10·1
Eastern	4,844	1,480	2,060,963	106,718	634,295	1,868,105	41,407	131,790	4,975,812†	7·0
E. Midlands	3,695	1,120	1,276,834	86,251	441,106	2,396,585	32,309	21,179	4,292,880†	7·1
Midlands	4,133	1,210	1,520,443	87,798	649,289*	3,437,930	33,503	19,524	5,837,481†	5·7
S. Wales	1,986	530	449,856	17,532	236 034	2,674,232	20,878	8,1 5	3,4 6,607	7·5
Merseyside and N. Wales ...	2,848	784	881,659	39,228	415,610	1,759,700	26,896	74,530	3,251,179†	6·5
Yorkshire	4,171	1,321	1,296,391	39,960	539,854	3,644,882	44,365	124,329	5,722,727†	4·7
N. Eastern	2,983	821	703,943	27,550	356,874	2,198,197	23,080	63,212	3,372,856	6·2
N. Western	4,555	1,464	1,563,388	80,475	763,164	3,848,483	55,852	41,922	6,353,284	8·6
S.E. Scotland	1,338	391	374,612	21,461	208,379	559,421	20,141	26,618	1,210,632	7·7
S.W. Scotland	2,575	771	824,813	52,283	396,798	1,609,285	55,485	—	2,938,664	5·5
Totals	47,433	14,384	16,642,665	778,899	7,688,992	28,205,718	534,352	634,169	54,831,441	6·5

* Including small industrial supplies.
† Including combined domestic and commercial (thousand kWh): Eastern, 132,534; East Midlands, 38,616; Midlands, 88,994; Merseyside and North Wales, 53,556; and Yorkshire, 32,946; total, 346,646.



General view of turbine and auxiliaries at Portobello high-pressure station (1,350 lb/sq. in)

to encourage the further expansion of these largely off-peak appliances.

Utilization research is proceeding, notably in the staff houses near Keadby power station where experimental dual-purpose heat pumps are being installed. A start was made on a year's comparison of electric and gas water heater operation. Test results showed the excellent load characteristics of immersion heaters in post-war housing estates. A test on 50 sample 12 kW instantaneous water heaters showed that the expenditure necessary to provide a three-phase service was not justified. Brief particulars of other sample tests are given.

A chapter of the report deals with employment and staff relations and covers such matters as terms and conditions of employment, joint consultation, safety, health and welfare, and education and training.

The total number of people employed by the B.E.A. and Electricity Boards at March last was 184,652, an increase of 1·9 per cent during the year. They were divided among the following classes:—Managerial and higher executive, 1,301 (0·7 per cent); technical engineering, 15,563 (8·4 per cent); executive, clerical, accountancy, sales, etc., 41,192 (22·3 per cent); manual, 119,358 (64·7 per cent); and technical trainees and apprentices, 7,238 (3·9 per cent).

Financial Results

The consolidated net surplus of the B.E.A. and Boards for 1953–54 was £13·19 million, as compared with the preceding year's figure of £7·53 million (including £250,000 provided against profits tax liability and written back when it proved not to be required). The B.E.A.'s own surplus was £8,011,727 (against £5,824,452) and the aggregate of the Boards' surpluses was £5,177,011 (against £1,456,371). Two of the Boards (Eastern and South Eastern) incurred deficits; six of them had adverse balances in 1952–53.

From the B.E.A.'s surplus £3,000,000 has been transferred to the central reserve fund. The Boards generally were not required to contribute to the fund but the North Western Board has made a contribution of £134,000, representing the amount it was unable to provide in 1950–51. On account of the unfavourable position of the South Western Board, which has a large rural area, that Board was granted £250,000 from the central reserve fund.

The trading revenue of the Central Authority amounted to £216·95 million (against £190·88 million), equivalent to 0·8321d per kWh sent out (against 0·7839d). The bulk of the revenue £216·36 million (against £190·36 million), or 0·8298d per kWh (against 0·7818d), came from the sale of electricity; the sale of steam brought in £590,000 (£520,000). Generation costs were £188·84 million (0·7295d per kWh), against £168·99 million (0·6999d) and the total working costs £198·53 million (0·7614d per kWh), against £177·72 million (0·7299d). The gross surplus was thus £18·42 million (0·0707d per kWh), against £13·16 million (0·0540d). After meeting administration costs, general expenses, training, safety and welfare

TABLE 6. AREA BOARDS' REVENUE AND EXPENDITURE

Board	Total Income		Total Expenditure		Net Surplus or Deficit		Revenue per kWh sold (pence)*	
	1952-53	1953-54	1952-53	1953-54	1952-53	1953-54	1952-53	1953-54
	£	£	£	£	£	£		
London	36,802,344	39,627,361	35,336,937	40,843,698	1,465,407	1,160,009	1·744	1·814
South Eastern	19,455,934	21,175,741	19,280,532	21,281,616	175,402	−105,875	1·542	1·573
Southern	22,038,322	24,834,987	21,931,991	24,231,193	106,331	603,794	1·512	1·593
South Western	10,854,462	12,420,816	11,003,429	12,322,560	−148,967	98,256	1·611	1·677
Eastern	28,773,667	32,340,328	29,185,659	32,535,589	−411,992	−195,261	1·446	1·521
East Midlands	20,819,853	23,574,913	21,130,776	23,333,938	−310,923	240,975	1·213	1·283
Midlands	27,502,985	31,486,960	28,144,588	31,105,709	−641,603	381,251	1·173	1·269
South Wales	13,696,243	15,267,767	13,339,898	15,074,519	365,345	193,248	1·028	1·064
Merseyside and N. Wales	16,585,705	18,475,221	16,389,038	17,935,932	196,667	539,289	1·277	1·336
Yorkshire	24,933,957	27,836,032	25,047,256	27,566,889	−113,299	269,143	1·067	1·137
North Eastern	16,297,304	18,294,567	16,263,567	17,875,421	33,737	419,146	1·206	1·272
North Western	31,358,860	35,025,248	30,687,461	34,003,725	671,399	1,021,523	1·267	1·296
S.E. Scotland	6,240,625	6,972,716	6,061,875	6,736,689	178,750	236,027	1·321	1·368
S.W. Scotland	14,364,829	16,358,910	14,465,712	16,043,424	−100,883	315,486	1·232	1·331
Totals (excluding inter-Board bulk supplies)	288,653,086	322,613,089	287,196,715	317,436,078	1,456,371	5,177,011	1·316	1·381

* Excluding inter-Board sales.

charges, etc., the surplus is £8·01 million (0·0307d per kWh) against £5·82 million (0·0239d).

The works costs of production of electricity per kWh sent out varied from 0·4607d (Yorkshire Division) to 0·6858d (South Western Division); the weighted average was 0·5574d, as compared with 0·5436d in 1952–53.

Among the points mentioned in this section is an increase of £1 million (to £2·42 million) under the heading training, safety and welfare, mainly due to superannuation requirements, including £1 million provisionally set aside to meet the extension of pension arrangements of manual workers. Expenditure charged to research rose from £104,000 to £243,000 largely on account of increased subscriptions to various bodies engaged in research of interest to the electricity supply industry.

TABLE 7. AVERAGE PRICE PER KWH SOLD

Class	1952-53	1953-54
	d	d
Industrial	1·088	1·143
Commercial	1·831	1·913
Domestic	1·452	1·532
Combined domestic and commercial ...	1·451	1·627
Farm	1·397	1·467
Traction	1·016	1·089
Public lighting	1·337	1·393
Totals	1·311	1·373

The aggregate surplus of £5·18 million of the fourteen Electricity Boards represent 1·6 per cent (0·023d per kWh) on the working margin. The latter is the difference between sales and purchase of electricity. Sales in 1953–54 brought in £315·45 million (1·381d per kWh) against £282·46 million (1·316d) in 1952–53. The purchase of electricity absorbed £212·68 million (0·931d) against £187·83 million (0·875d), leaving a working margin of £102·77 million (0·450d), as compared with £94·63 million (0·441d). Other expenses amounted to £97·59 million net (0·427d) against £93·17 million (0·434d).

It will be seen from Table 6 that the revenue per kWh sold (excluding inter-Board sales) ranged from 1·064d in South Wales to 1·814d in London, the average being 1·381d (against 1·316d in 1952–53). From the various classes the revenue per kWh was as shown in Table 7.

Table 8 shows that the Board's revenue from installation work and the sale of fittings increased from £26·3 million to £31·7 million. This was attributable mainly to a substantial rise in hire-purchase and similar business—from £8·1 million to £12·3 million. It will be noticed that the greatest activity in this direction was shown by the Eastern Board whose total sales went up from £4·4 million to £5·3 million. The overall net surplus of 1·8 per cent compares with a loss of 0·6 per cent for 1952–53. Last year only two Boards reported deficits (South Western and South Wales); in 1952–53 there were five in this position and the fourteen Boards as a whole showed a loss of £150,221.

The consolidated balance sheet of the B.E.A. and Boards gives the value of fixed assets (less depreciation and other provisions) as £953·96 million (against £839·97 million at 31st March, 1953), interests in subsidiary companies and investments as £28·37 million (£26·93 million), current assets less current liabilities (excluding temporary borrowings) and provisions as £62·54 million (£63·3 million) and intangible assets as £37·96 million (£44·16 million). These items were financed as follows:—British Electricity Stock £865·96 million (£741·14 million), obligations to local authorities £102·08 million (£113·39 million), temporary borrowings £74·23 million (£92·34 million), and reserves and revenue balances £41·52 million (£28·33 million).

The reports of the individual Electricity Boards are also available at 1s. 6d. each.

Minister's Report

Accompanying the B.E.A.'s and Boards' reports is the customary report of the Minister of Fuel and Power. This details appointments and re-appointments to the B.E.A. and Boards during the year.

Under the heading "General Policy" the Minister refers to the necessity for adapting the power station programme to take account of the nation's present and prospective fuel resources. This has led to investigations of the possibility of installing dual (coal-oil) firing apparatus at appropriate stations and the exploration of the possibility of associating the electricity authorities with the development of nuclear power plant.

Construction programmes were also considered in the light of the continued expansion of the demand for electricity, the available resources and other claims for capital investment. The previously-approved programme, providing for a maximum annual rate of commissioning of 1,750 MW in 1959, was reviewed and the figure has now been raised to 1,950 MW for 1959 and 1960. A special increase in capital expenditure of £1½ million was sanctioned for rural electrification in the eighteen-month period up to the end of this year.

At the same time it was recognized that consumers should be encouraged to use electricity in such a way as to create an economic load. Accordingly the restrictions on publicity and advertising were removed.

The Beaver Committee appointed in 1952 reported in

TABLE 8. ELECTRICAL CONTRACTING AND SALES OF FITTINGS

Board	Sales		Direct Costs				Indirect Costs		Surplus or Deficit			
	1952-53	1953-54	1952-53	Per cent*	1953-54	Per cent*	1952-53	1953-54	1952-53	Per cent*	1953-54	Per cent*
	£	£	£		£		£	£	£		£	
London	2,764,111	3,047,190	2,269,057	82·1	2,526,951	82·9	480,912	470,685	14,142	0·5	49,554	1·6
S. Eastern	1,924,312	2,375,967	1,503,746	78·1	1,869,694	78·7	411,640	425,561	8,926	0·5	80,712	3·4
Southern	2,493,538	2,814,407	2,014,544	80·8	2,238,672	79·5	469,581	530,026	9,413	0·4	45,709	1·6
S. Western	1,613,620	1,919,017	1,241,208	76·9	1,534,071	79·9	407,201	443,245	−34,789	−2·1	−58,299	−3·0
Eastern	4,418,780	5,309,185	3,608,557	81·7	4,322,047	81·4	842,099	849,287	−31,876	−0·7	137,851	2·6
E. Midlands	1,344,006	1,504,625	1,098,109	81·7	1,226,915	81·5	228,497	241,820	17,400	1·3	35,890	2·4
Midlands	3,683,101	4,254,168	2,992,734	81·3	3,391,125	79·7	773,800	837,319	−83,433	−2·3	25,724	0·6
S. Wales	786,322	1,070,746	650,729	82·8	893,131	83·4	203,630	236,630	−68,037	−8·7	−58,741	−5·5
Merseyside and N. Wales ...	1,060,184	1,391,753	846,237	79·8	1,138,524	81·8	192,923	205,670	21,024	2·0	47,559	3·4
Yorkshire	2,150,715	2,672,517	1,778,018	82·7	2,211,989	82·8	362,061	378,769	10,636	0·5	81,759	3·0
N. Eastern	820,389	1,088,137	684,273	83·4	881,460	81·0	112,228	130,390	23,888	2·9	76,287	7·0
N. Western	2,313,396	3,151,249	1,961,982	84·8	2,593,826	82·3	408,075	478,086	−56,661	−2·4	79,337	2·5
S.E Scotland	466,684	572,466	365,511	78·3	460,134	80·4	97,009	90,245	4,164	0·9	22,087	3·8
S.W. Scotland	462,794	569,653	385,273	83·3	477,709	83·9	62,539	73,377	14,982	3·2	18,567	3·2
Totals	26,301,952	31,741,080	21,399,978	81·4	25,766,248	81·2	5,052,195	5,390,836	−150,221	−0·6	583,996	1·8

* On total sales.

June last year making recommendations for reducing the cost and time of construction of power stations. These recommendations are under discussion with the B.E.A. and the appropriate Departments. Research and education and training programmes drawn up by the B.E.A. were approved.

Consent was given for the issue in April, 1953, of £125 million of British Electricity 4¼ per cent Guaranteed Stock (1974–79). The proceeds from this stock enabled the limit of temporary borrowing to be reduced from £130 million to £35 million but the limit was subsequently raised to £80 million. Consent was also given to the temporary employment within the industry of contributions carried to the redemption fund accounts of the Authority in 1953–54, on the understanding that the moneys so employed would be replaced out of the proceeds of the next stock issue.

Details are given of compulsory purchase orders and other orders made during the year. The Minister issued consents for the construction of the Barony (Ayrshire), South Denes (Great Yarmouth) and Willington (Derby) stations. Consent was refused, after a public inquiry, to the construction of a station at Machen, near Newport (Mon.). Extensions to six existing stations were approved; these and the new stations sanctioned represent an aggregate installed capacity of 1,186·5 MW. A total of 9,906 consents to overhead lines were issued.

The rest of the report covers proceedings under the Electricity Supply Regulations, etc. It is noted that 34 persons (including 22 members of the public) were killed and 325 injured (including 109 members of the public) as a result of accidents in connection with the "works or circuits" of Electricity Boards. The figures include accidents in which 43 members of the public were injured (13 fatally) when mobile elevators, cranes and the like accidentally touched overhead lines.

LETTERS TO THE EDITOR

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents.

Comparative Transport Charges

THE comparison between transport charges in London and Glasgow, to which you referred in a recent issue, becomes even more impressive if actual figures are quoted. These are:—

Fare	London buses miles	Glasgow trams miles
2d	1	1½
3d		2¼
4d	2	3⅜
5d		4½
6d	3	12

To travel 12 miles by London bus costs 1s 6d. You rightly praise the contribution of the trolley-bus to the economy of the Glasgow system, but it should not be forgotten that the trolley-buses are all less than five years old. The achievement of the trams, which form by far the largest part of the transport system, is even more remarkable when it is realized that 450 of them are over fifty years old.

This shows that even old trams, efficiently operated, can provide cheap transport. A completely modernized tramway system would be cheaper still. There is a place for the trolley-bus in Glasgow, in replacement of a few less suitable tram routes and in place of diesel buses, but for the main routes a fleet of modern trams would be ideal. The 250 modern trams in service are fine vehicles, but single-deck cars of Continental pattern would be preferable; Mr. Fitzpayne suggested an experiment with such cars a few years ago. The modernized tramways could then be integrated with the proposed electrified suburban railways.

F. K. FARRELL, B.A., A.M.I.E.E.

*London, S.W.*18.

The Cross-Jet Bridge

THE article in the *Electrical Review* of 17th September and the claims which the author, Mr. D. R. Davies, makes on technical grounds on the subject of movably mounted arc control devices are indeed interesting, but I feel sure that many of your readers would expect me to challenge his claim of originality.

There has been sufficient publication in past years relating to the mounting of arc control devices on the moving component of a circuit breaker to dispose of such a claim, and as the majority of supply engineers and switchgear designers are conversant with the principle of the arc trap circuit breaker, supplied by my company during recent years, I feel sure they will establish their own views on this matter.

It is not my intention, at this juncture, seriously to enter into the controversial subject of up-rating existing circuit breakers by the fitting of certain new components on site, except to suggest that divided responsibilities are thereby introduced with the attendant disadvantages when critical issues arise. I recognize it as a step in the right direction, but if the site work is not associated with a complete overhaul of the circuit breaker, confidence may be dangerously misplaced.

Furthermore, I have always held the view that a manually operated breaker should be capable of safely containing the effects of any maladjustment or otherwise indifferent operation of its arc control devices.

Leeds.

GEORGE CATON,
Managing Director,
Yorkshire Switchgear & Engineering Co., Ltd.

Junior Institution's New Headquarters

SINCE its foundation in 1884 the Junior Institution of Engineers has not, until now, had a permanent home of its own. Until 1901 the office was wherever the secretary happened to be living and then an office was rented in Victoria Street, S.W.1, which continued to serve as its meeting place until the transfer to Pepys House, 14, Rochester Row, S.W.1, last week.

The new headquarters, which was officially opened by Viscount Falmouth, is a converted Victorian Gothic style building, in which ample space is provided for the growing membership of the Institution, now numbering 1,600. The main lecture room is fitted with a platform and demonstration bench at one end and a projector box at the other, fitted with a sound cinema projector and lantern. An epidiascope is also available. It has seating capacity for 150 and acoustic properties are excellent. On the right of the main entrance hall are the secretary's and general offices. The first floor includes a well-stocked library and members' lounge and an office for duplicating equipment, etc. Total cost of the conversion was in the region of £21,000 and more than half of this has been borne by the members themselves.

The I.E.C. in Philadelphia

Impressions of the Social Aspects of the Golden Jubilee Meeting

From a Correspondent

THE year 1954 will be remembered among members of the electrical engineering world as the golden jubilee of the International Electrotechnical Commission, which originated in a meeting of the Chamber of Delegates of the International Congress of St. Louis, held on 15th September, 1904, under the chairmanship of Professor Elihu Thompson. At that meeting it was resolved to interest all countries in the standardization of the nomenclature and ratings of electrical apparatus and machinery; and the measure of the success of its endeavours may be gauged by the size of the jubilee meeting which has just come to an end. Over six hundred delegates and committee men from twenty-two countries participated, and committees on fifty branches of the subject held upwards of three hundred meetings.

Philadelphia was chosen for the actual scene of the deliberations principally because the University buildings offered unusual facilities for coping with so large a gathering. Ample space for full assembles was provided in the auditorium of Houston Hall, the social centre of the University, and in the University Museum, while the committees were accommodated in the many lecture rooms of the various colleges. Even the students' dormitories were made available to the visitors, as was the excellent cafeteria.

The proceedings opened at 9.30 a.m. on 1st September, when the president of the United States National Committee of the I.E.C., Mr. Sogge, welcomed the delegates in the beautiful auditorium of Houston Hall, where a large, comfortable lounge was put at their disposal. From then onwards the actual committee work continued each day, with breaks for social events, until 16th September. The meeting then adjourned until next year, when it is hoped to hold the next convention in London.

Jubilee Celebrations

Jubilee day, 9th September, was devoted entirely to celebrations. The meeting was held in the assembly room of the University Museum, and the proceedings were opened by Dr. Harold S. Osborne, president of the I.E.C. The principal address was given by Dr. Harald Sterky, Director General of Swedish Telecommunications, who spoke of the recent development of international telecommunication made possible through standardization, and who envisaged a future when such things as international television would be a reality. He pointed out that it was but 88 years since the first successful laying of the transatlantic telegraph cable, and he felt that it was not fantastic to look forward to the time when all lands would be linked up by telephone, so that verbal instantaneous communication could take place between, say, the rubber planter in Malaya and his head office in London.

Dr. P. Dunsheath, C.B.E., the treasurer of the I.E.C., then made an announcement which was warmly received by the many members of the I.E.C. who had known the late Mr. le Maistre, and realized how much of his life he had devoted to the furtherance of the cause of standardization. A trust fund had been formed amounting at present to 20,000 Swiss francs, from which it was hoped to provide an honorarium for a yearly lecture by a prominent engineer in memory of Mr. le Maistre and his work—a fitting tribute to a life unselfishly devoted to the betterment of international understanding.

The afternoon session was brought to a close by the principal British delegate, Lord Waverley, P.C., G.C.B., G.C.S.I., F.R.S. (better known perhaps as Sir John Anderson), who referred to the important part such bodies as the I.E.C. played in international affairs, and what opportunities they afforded for the formation and fostering of real friendship between men of different races and loyalties. He thought that the concourse of thirty member countries gave an exceptional occasion to contribute to world harmony, and believed that the I.E.C. might act as a cornerstone of co-operation between the nations.

The jubilee day proceedings concluded with a banquet at the Bellvue Statford Hotel, where the leading delegates from over the world were introduced by Mr. Walter L. Cisler, president of the Detroit Edison Company, and the speakers included Mr. A. C. Monteith, vice-president, Westinghouse Corporation and president of the A.I.E.E., Mr. Don Mitchell and Dr. Harold S. Osborne.

The general feeling at the end of the meeting was a sense of satisfaction with the progress made in reaching some element of international give and take, but it must be left to the future to show how much the internationally agreed standard details can be carried over into the national standards of each country, which often have to deviate therefrom to some extent owing to the basic differences in national requirements.

In addition to the serious work of the I.E.C., the delegates and their wives were given the most wonderful social opportunities, all of them arranged and carried out with extreme punctuality and attention to detail. Perhaps the highlight of these functions was the visit to Washington, which took place on Sunday and Monday, 12th and 13th September, five hundred people taking part. On the Monday coach tours were arranged to Arlington Cemetery and Mount Vernon, the home of George Washington, and to the Bureau of Standards.

Other memorable occasions were visits to Longwood Gardens, to attend an open-air concert by the famous Hampton choir, followed by a display of coloured illuminated fountains of remarkable beauty; a picnic to the farm of Mr. Ashplandh; visits to Valley Forge and the Washington Memorial Church; and to the Newcomen Society's lovely headquarters, the latter for English people only. The main impression left on the mind is the overwhelming kindness and generosity of our American hosts. The whole organization was wonderfully conceived, and carried out to the last detail without a hitch.

Royal Society of Arts

A ten-volume index of the *Journal* of the Royal Society of Arts, covering the years 1942 to 1952, and volumes XCI to C, will shortly be published. The value of the *Journal* as a work of reference needs no emphasis, and this comprehensive and detailed index, extending to about 64 pages, will be an invaluable aid to its use. The price will be 5s.

PERSONAL AND SOCIAL

News of Men and Women of the Industry

The General Electric Co., Ltd., announces that in addition to his present responsibilities as sales manager of the London and Southern England Area, **Mr. W. J. Bird** has been appointed deputy sales manager of the company. Mr. Bird, who is now forty-four years of age, was educated at King Edward's School, Birmingham. He joined the G.E.C. as a student apprentice at Witton Engineering Works in 1925 and after some years on the engineering sales staff at Liverpool and Birmingham, was in 1940 appointed manager, industrial sales department, Birmingham, and in 1942 assistant district manager, Midland Area. In 1949 Mr. Bird transferred to head office as an assistant to Mr. T. W. Heather, sales director, and in 1950 was appointed London sales manager. In recent years he has been closely associated with the organizing body of the Electrical Industries National Golf Championship, of which he is now deputy chairman.

Mr. W. J. Bird

Mr. S. A. Millington has from health considerations resigned his positions as director and general manager of J. H. Tucker & Co., Ltd., and the Kersons Manufacturing Co., Ltd. He has been with J. H. Tucker & Co., Ltd., for forty-four years. During further medical treatment he will be staying at Gull Cottage, St. Agnes, Cornwall.

Mr. K. E. Pickard, manager of the Liverpool branch of Hirst, Ibbetson & Taylor, Ltd., has been made a director of the company.

Mr. K. E. Pickard

Mr. G. W. Ryall, manager of the repair department of the Midland Electric Installation Co., Ltd., retires today (Friday) after thirty years' service. He will remain a director of the subsidiary company, Shoolbred Rewinds, Ltd., Luton. **Mr. D. N. Brittain,** who has been assistant to Mr. Ryall for many years, has been appointed the new manager of the repair department. The directors gave a complimentary lunch to Mr. Ryall last Monday when a refrigerator was presented to him.

Mr. J. P. Ford, managing director of Associated British Oil Engines (Export), Ltd., British Export, Ltd., and National Oil Engines (Export), Ltd., left by air on 22nd September for a tour of Latin America. His object is to find ways of increasing trade between this country and the South American continent, particularly for power plant and capital engineering equipment. He is chairman of the Institute of Export and a council member of the London Chamber of Commerce. At the Government's request, he will be giving talks on British industry to Chambers of Commerce and other meetings of industrialists in Central and South America.

Metropolitan-Vickers Electrical Co., Ltd., announces that from 1st August **Mr. R. R. Whyte,** M.B.E., B.Sc.(Eng.), has assumed control of the company's Germiston Works, Glasgow, manufacturing steam turbine condensers and associated auxiliaries. This is in addition to his present responsibilities as superintendent, small turbine department (Trafford Park). Educated at University College School and City and Guilds Engineering College, London, and at Freiburg University, Mr. Whyte went to Metrovick as a college apprentice in February, 1933. After six months extended apprenticeship at the Prague Works of the C.K.D. he joined the turbine experimental department at Trafford Park, and two years later transferred to the steam turbine manufacturing department. In 1944 he became assistant superintendent, and in 1949 superintendent of the gas turbine (now small turbine) department.

Mr. R. R. Whyte

Mr. G. J. Wells, who has been associated with the Engineering & Lighting Equipment Co., Ltd., for a great number of years, retired yesterday from all his activities with the company.

Mr. K. Silveston has joined the Mersey Cable Works, Ltd., as sales engineer for South-East England, in succession to Mr. C. J. Penny. For the last four years he has been with Enfield Cables as sales engineer for the Brighton area.

Mr. D. S. Johnson, formerly electrical development engineer at Platt Bros. & Co., Ltd., has joined the sales staff of the British Thomson-Houston Co.'s Manchester office. He will specialize in the application of electrical equipment to textile machinery.

R. Lowther, Ltd., announce the newly created appointment of sales manager. This position is filled by **Mr. Ronald A. Norrington,** who has had seven years' experience as technical representative in the electrical and lighting fields.

Mr. E. E. Pope, formerly district manager at Maidstone of the South Eastern Electricity Board, retired from the service of Seeboard on 30th September.

There was a large gathering at Londonderry House, Park Lane, London, W., on Friday last of electrical wholesalers and friends with their ladies. The occasion was a supper-dance organized by the London and Western Section of the **Electrical Wholesalers' Federation** to augment the funds of the Electrical Industries Benevolent Association. A buffet supper enabled dancing to be continuous from 9 p.m. to 2 a.m. A competition for a number of electrical appliances given by electrical manufacturers found everybody willing and eager to part with their money in a good cause, and there was a continuous queue practically the whole of the evening waiting to participate. Altogether the function proved very popular and the E.I.B.A. will benefit considerably.

The **General Electric Company's** annual golf meeting held at Sonning on 18th September was as usual a great success. Sixty-six members of the staff attended, many of them from overseas branches. The prizes were presented in the evening by the Hon. Mrs. Leslie Gamage.

The Hon. Mrs. Leslie Gamage presenting the Australia Cup for senior veterans to Mr. R. E. Robinson, director G.E.C. Telephone, Radio & Television Works, Coventry. With them is Mr. L. Gamage, M.C., vice-chairman and joint managing director of the company.

British members of technical committees on electric lamps and accessories at the meeting of the International Electrotechnical Commission in Philadelphia. From left to right: Back row—Mr. A. G. Penny, Dr. J. W. Strange, Mr. J. F. Stanley and Mr. G. T. Winch. Front row—Dr. A. B. Whitworth, Mr. F. J. Hawkins, Mr. W. J. Jones and Mr. A. J. Whittenham

Sir George Usher, who is an active director of both International Combustion (Holdings), Ltd., and Aberdare Cables, Ltd., is on a short visit to this country in connection with the companies' business. Sir George, who now lives in South Africa, is chairman and managing director of International Combustion Africa, Ltd., and a director of Aberdare Cables (Africa), Ltd.

Mr. O. H. Hosking, M.I.E.E., sub-area engineer, Wolverhampton and District, Midlands Electricity Board, is shortly to retire. Before nationalization, he was chief assistant engineer to the West Midlands Joint Electricity Authority for six years. Earlier he served as chief assistant engineer with the Watford undertaking for eight years, having vacated the post of personal technical assistant to the chief engineer and general manager of the Croydon Electricity Department to take up that post.

Mr. O. H. Hosking

Mr. B. C. Robinson is the president of the Newport and District Electric Club for the 1954-55 session. During the past year the club has contributed £10 10s. to the E.I.B.A. and also inaugurated an annual prize of £5 5s. to be presented to a student of the Newport Technical College who has made the most progress in the first three years of the ordinary national certificate course. The award is named the Buckley-Robinson Memorial Prize to commemorate the work of the late Mr. C. H. Buckley (the first president) and the late Mr. F. C. Robinson (the first secretary).

Mr. T. E. Goldup, C.B.E., M.I.E.E., is visiting the United States to attend a meeting of the International Electrotechnical Commission. He is chairman of the Committee of the Commission which deals with electronic tubes and valves. During his stay, Mr. Goldup will take an opportunity of studying the latest electronic developments in America.

The **Electrical Industries Benevolent Association** is holding its annual ball on 12th November at Grosvenor House, Park Lane, London, W. Eric Robinson's orchestra will play for the dancing and there will be a midnight entertainment. Tickets (2½ guineas each) can now be obtained from the Association at 32, Old Burlington Street, London, W.1.

OBITUARY

Mr. D. R. A. Pistor, a director of B.K.B. Electric Motors, Ltd., and for nearly forty years manager of the Hibbert Street works of George Kent, Ltd., died suddenly on 23rd September while on holiday in Scotland.

Mr. A. B. Cooper.—The death occurred at Toronto, Canada, on 15th September, at the age of seventy, of Mr. Ashton Burton Cooper, B.Sc., M.I.E.E., a director of Ferranti, Ltd. Mr. Cooper had been associated with the Ferranti Electric, Ltd., Canada, since 1922 when he was appointed general manager. In 1942 he became president of the Canadian company and was elected to the board of Ferranti, Ltd., in 1947. He remained president of the Canadian company after his retirement from active management in 1947.

The late Mr. A. B. Cooper

Mr. Cooper was born at Bloomfield and received his early education in Prince Edward County schools, Boston, Mass. He graduated from Tufts College, Boston, Mass., and passed through the General Electric's test course at Schenectady. After a year with the Westinghouse Co., he joined the Brazilian Traction Co. and assisted in the construction of the first hydro-electric generating station transmitting power to Rio de Janeiro. He returned to the General Electric Co. in 1908 and in 1913 joined the Canadian General Electric Co., in charge of transformer sales. Mr. Cooper was the first president of the Canadian Electrical Manufacturers' Association, and was a past vice-president and director at large of the American Institute of Electrical Engineers.

Mr. J. Webb.—The death occurred suddenly on 12th September at Gwelo, Southern Rhodesia, of Mr. John Webb, C.M.G., C.B.E., M.C., M.I.E.E., who until his retirement in 1946 was Inspector-General, Egyptian State Telegraphs and Telephones. An official of the British General Post Office, Mr. Webb was seconded to the Egyptian Government and during his fifteen years in Egypt the telephone systems of Cairo and Alexandria were converted to automatic operation.

Mr. J. H. Payne, engineer of the Leicester Sub-Area of the East Midlands Electricity Board, died on 23rd September. He joined the Leicester Corporation Electricity Department as mains engineer in 1924, becoming mains superintendent in 1942. After attending the Higher Grade Public School, Broxburn, West Lothian, he received his technical education at the Heriot-Watt College, Edinburgh, and was with the English Electric Co. before going to Leicester.

WILLS

Mr. C. J. Page, principal of the firm of Page & Stibbs, electrical contractors, who died on 15th January, 1953, left £38,227 gross (£37,580 net).

Sir Maurice G. Simpson, formerly a director of W.T. Henley's Telegraph Works Co., Ltd., who died on 2nd July last, left £1,110 gross (£1,012 net).

Prices of Materials

In the accompanying table we give the basis prices of the more important materials used in the electrical industry. The figures given are the selling prices and are those quoted on Tuesday last.

ALUMINIUM Ingots	ton £156 0s 0d
COPPER, H.C. Electro	ton £268 0s 0d
Fire Refined 99·70%	ton £267 0s 0d
Fire Refined 99·50%	ton £266 0s 0d
COPPER Tubes ..	lb 2s 7½d
Sheet	ton £333 15s 0d
H.C. wire and strip ..	ton £305 10s 0d
LEAD, English ..	ton £102 15s 0d
Foreign	ton £101 0s 0d
MERCURY	flask £105 0s 0d
TIN, block (English) ..	ton £736 10s 0d
ZINC, G.O.B. Foreign	ton £81 5s 0d
Electrolytic	ton £84 10s 0d
BRASS Tubes (solid drawn)	lb 2s 1½d
Sheet	ton £268 5s 0d
Wire	lb 2s 8⅜d
PHOSPHOR BRONZE Wire	lb 4 1½d
PLATINUM	oz £30 0s 0d
RUBBER, No. 1 R.S.S. spot	lb 21d–21½d

Refrigerator Manufacture

NEW PORTSMOUTH FACTORY NOW IN FULL PRODUCTION

IN 1949 the volume of orders received by the General Electric Co., Ltd., for refrigerators made it essential to find extra productive space. A factory at Portsmouth was therefore purchased and converted, with numerous extensions, for the manufacture, processing and assembly of the cabinets, the manufacture of the sealed system being continued at the Wembley and North Circular Road factories.

Special arrangements were made for training new staff before the move itself began. A large amount of machinery had to be moved from Wembley, but by planning the change-over section by section, this was accomplished without a decrease in production and the first refrigerator came off the production lines less than one year after the initial take-over at Portsmouth.

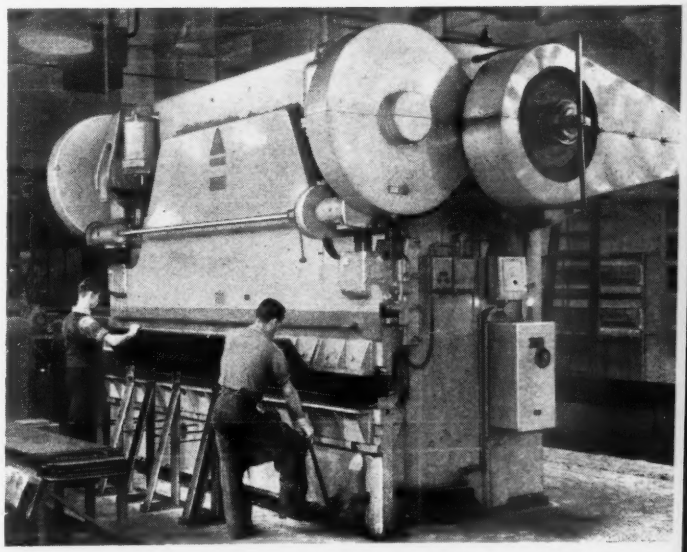
Apart from the fabrication of the smaller sheet metal parts the "flow line" method is employed at Portsmouth and from the arrival of the raw materials to the despatch of the finished refrigerators, the production line follows the pattern of a letter "W."

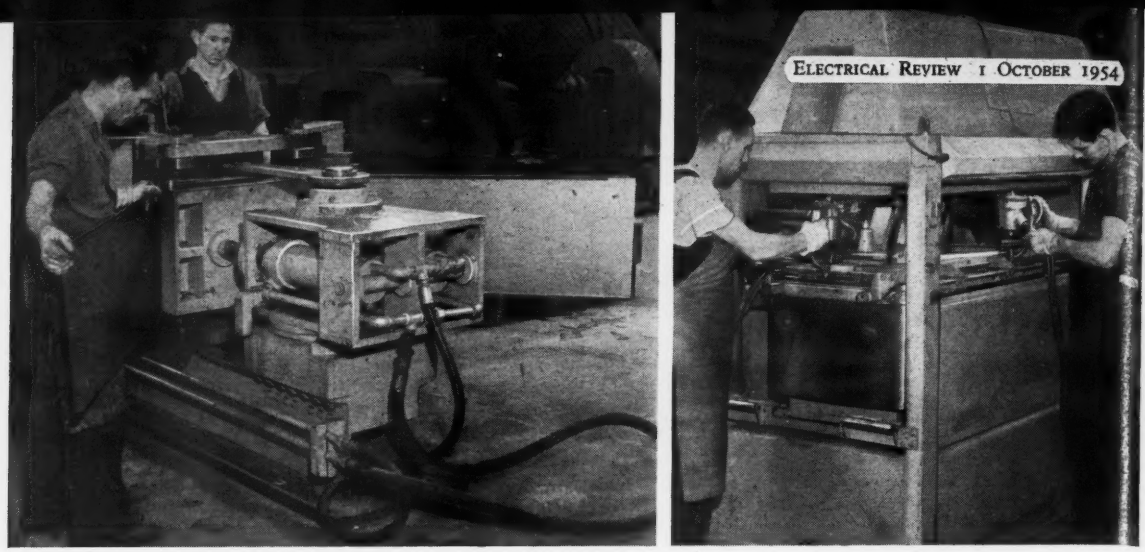
The sheet metal, received directly from the rolling mills, is off-loaded by a travelling electric hoist and deposited in the store without further handling. As far as possible the metal is ordered cut to size to minimize guillotining and wastage. The sheet metal shop occupies an area covering one side of the works from end to end. It comprises the main cabinet line of special-purpose machinery into which are fed at various points sub-assemblies and small parts fabricated in power presses, the latter ranging from 28 to 100 tons.

Before issue to the shop, the metal is carefully inspected, particularly the long wrapper sheet which eventually becomes the outside of the cabinet. The sheets are placed in a special-purpose notching and piercing machine comprising several small power presses in a permanent setting all of which operate simultaneously. The next step is the formation of the right-angled double fold on the front edge of the sheet and single bend on the back. Three operations using special patented tools in a 12ft 240 ton press brake are necessary in this process, which is particularly important because if the front edge of the wrapper sheet is not perfectly true, the door will not "seal" effectively.

The wrapper sheet with edges fully formed is fed into a Wells tangent bender, a special-purpose machine which bends the sheet to a "U" shape. The sheet has now assumed the outline of a refrigerator and is ready to have the back panel assembly spot-welded on to it. This

The title picture shows general view of the assembly department. Below: A 240 ton press brake with three-way special purpose tools for folding the front and back edges of the wrapper sheets which become the outside of the cabinets





Left: With the edges fully formed the wrapper sheet is fed into a tangent bender which forms it into a "U" shape. Right: Spot welding the back panel to the formed wrapper sheet in a specially designed reaction bar welder

operation is performed in a reaction bar welder designed specifically for the job. More spot-welding operations in various jigs follow for the positioning of the support plate, strengthening gussets and stays and bumper rail assembly. By this time the cabinet is of exceptional structural rigidity, able to withstand even the roughest handling. The only remaining task before metal finishing is sealing by the carbon process, using copper filler rod for small spaces and seams requiring extra strength.

In the metal finishing section inspectors mark all spots (not always visible to the untrained eye) which need the attention of panel beaters, discers, etc. Particular care is taken with the final burnishing as the appearance of the complete refrigerator depends very largely on the quality of the metal finishers' work.

The manufacture of interiors or liners, as they form an independent section, is not a part of the "flow line" production. Heavy gauge steel sheet for the interiors is first trimmed to size on the guillotines and then processed through 100 ton power presses for forming and piercing. Folding to "box shape" prior to welding takes place in an 8ft press brake.

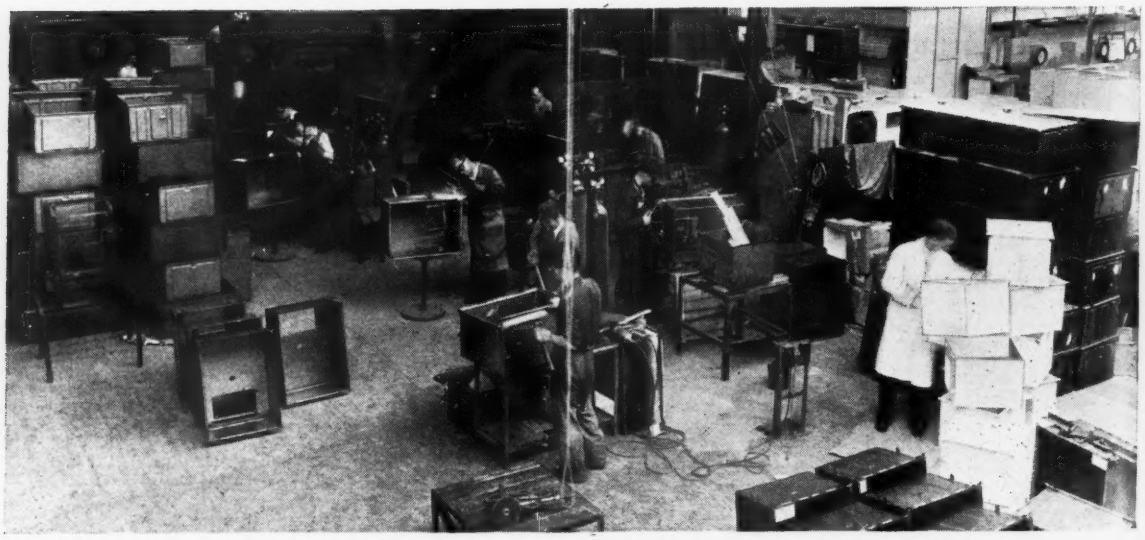
Apart from the corner pieces and hanging lugs, which are oxy-acetylene welded, all seams are atomic hydrogen welded. This process uses no welding material so that the weld is absolutely pure, with no foreign metal whatsoever. Carbonization and oxidization are eliminated—an important point because these faults would be detrimental to the vitreous enamel which is applied later. A short line in the sheet metal shop is mainly concerned with the spot-welding of corner pieces, stiffeners, etc. It merges with the "cabinet line" in the metal finishing section.

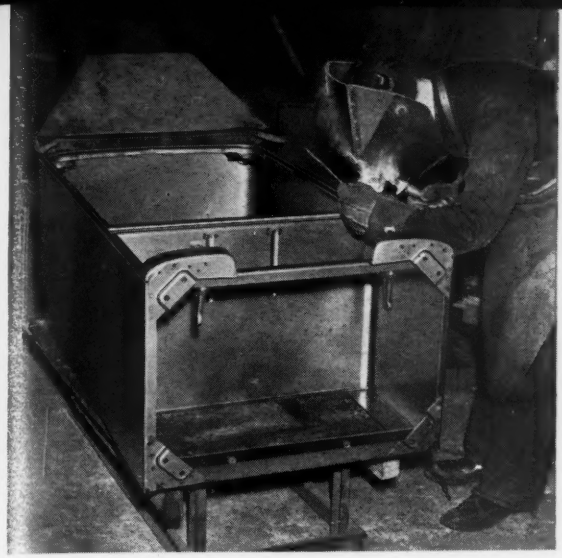
To ensure a thoroughly clean and neutralized surface, all parts before painting pass through a chemical cleaning plant, which is completely "conveyorized" and enclosed. Parts leaving the cleaning plant are not touched by hand as the conveyor travels directly to the first water-wash spray booth where an acid-based etch primer is applied. The components then travel through a short infra-red-ray tunnel which acts as a solvent flash-off.

The parts are then loaded on to another conveyor to receive the white primer and after being sprayed enter a 21ft infra-red-ray tunnel where the paint is cured at a rigidly controlled high temperature. After being off-loaded the parts are lightly rubbed down to prepare the surface for the final coats of enamel.

The final water-wash spray is air conditioned and kept at a constant temperature with an air intake of 30,000 cu ft/min and exhaust of 28,000 cu ft/min, giving a "bleed-

The section of the factory where the interiors of the refrigerators are fabricated and assembled





The carbon welding process is employed on the cabinets for filling small spaces and seams requiring extra strength

off " of 2,000 cu ft/min so that no particles of dust or other foreign matter enter the booth. Also, the filtered air in the booth at all times moves towards the water screen where surplus paint spray is washed away. Once the work is loaded on to the finish conveyor, the last treatment before the actual spraying is a rub down with slightly sticky rags to which all dust particles adhere, thus ensuring a perfectly clean surface.

The first of the finish coats is then applied, after which the work travels to the next spraying stage, a few minutes having been allowed for a solvent flash-off before the final wet-on-wet application. Next the work enters an infra-red-ray tunnel and is baked, again at a high temperature. The spraying completed, the work is carefully inspected under powerful lamps and even the most minute flaw is sufficient for its rejection and re-processing.

The first step in assembly is the placing of the empty cabinet on the roller conveyor and sealing of all seams in the cabinet with a bitumastic compound. This prevents seepage into the " Fibreglass " insulation of unpleasant odours and, particularly in tropical countries, moisture or insects. The thermostat and " ordered to size " bonded " Fibreglass " are now fitted and the vitreous enamelled interior is screwed into position. A wooden platform, which is in effect the packing crate base, is bolted into position to allow the cabinet to be rolled down the " line " in an upright position through the various stages of assembly. By the time the end of the line is reached the sealed system has been fitted, the door hung and all the various parts assembled in position.

The refrigerator is now ready for inspection and a thorough check, both mechanical and visual, is made of all points, particular attention being paid to the door seal and door handle mechanism. A low voltage electrical test is carried out to ensure that the refrigerator will function even during supply fluctuations, and a consumption check is made. In the final test the refrigerator is run for one hour and tested for leaks, noise and temperature. In addition to this normal test, 10 per cent of the production undergoes a twenty-four hour tropical test in a room maintained at tropical temperature and equipped with recording instruments.

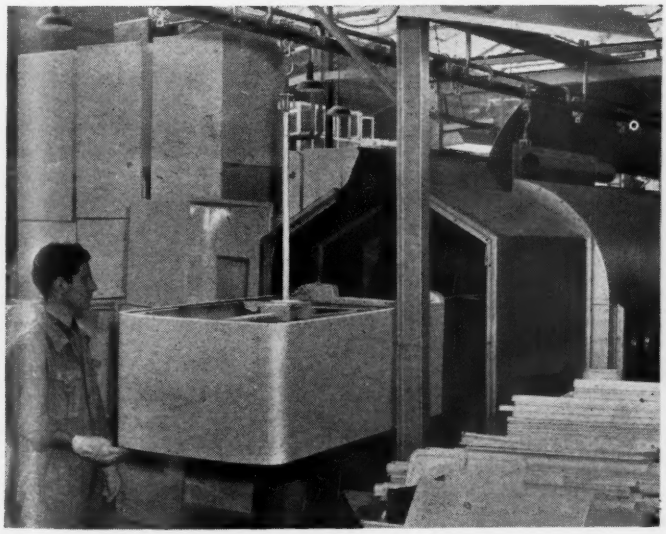
The sealed system has already been thoroughly tested at the Wembley works, and these additional tests are merely a double check. Record cards for the sealed systems manufactured at Wembley are despatched to Portsmouth with the systems, and are completed there with further notes on performance after being made up into complete refrigerators so that a comprehensive " case history " is compiled of every unit produced.

The refrigerator is now prepared for packing by being thoroughly cleaned and polished, and having the shelves fitted. A little farther down the line there is a final close scrutiny of the job under colour matching fluorescent tubes. The plastic dishes and glass shelves are packed in specially made containers which are a tight fit in the interior to prevent movement in transit. The packing crate is of open slat construction, for it has been found that loaders are a little more careful when they can see what is inside than if they were handling a close-boarded wooden case.

In the back panel of the refrigerator, already welded, are two strongly constructed gussets into which are brazed machine turned threaded bosses. The back of the crate is bolted securely into these bosses and the previously fitted wooden base now forms part of the crate. By simply screwing on the front, sides and top of the crate, packing is complete.

We thank the General Electric Co., Ltd., for permission to visit the factory and for assistance in the preparation of this article.

Left: Cabinet leaving the infra-red-ray baking tunnel. Right: Section of the assembly line



Telecommunications Research

Work of the Post Office Engineering Research Station

LAST week a series of "open days" was held at the Post Office Engineering Research Station, Dollis Hill, London, in order that interested engineers might familiarize themselves with the varied investigations which the G.P.O. is conducting.

One improvement the possibilities of which are being examined is the use of electronic equipment in the telephone exchange. The present automatic telephone service is provided by electromechanical switches, the moving parts of which wear and require re-adjustment and maintenance. The electrical circuits are completed by electrical contacts pressing against each other, and these contacts are also subject to electrical and mechanical wear. Automatic telephone switching by electronic means, using thermionic valves and cold cathode tubes, would eliminate moving parts and pressure-operated electrical contacts, and would also give very much faster operation. To gain experience in electronic switching, an exchange has been constructed to provide some of the internal telephone service of the research station. It is equipped with 50 lines and can be later increased to 99 lines. Each line is allocated a very short electrical pulse which is repeated at rapid intervals, the pulses for the different lines being interleaved at intervals of one μ sec. The speech and signalling information for a particular line is conveyed by varying the amplitude of the pulse allocated to that line.

In the Post Office system the small currents representing speech or television pictures are transmitted over long distances by underground cables. Owing to the attenuation which occurs they are "boosted" at intervals by thermionic amplifiers. On the occasion of our visit we saw an exhibit illustrating the progress that has been made in the design of these amplifiers. A modern amplifier is capable of handling 960 telephone conversations simultaneously, or alternatively of transmitting a television signal, and is about half the size of an amplifier in use 25 years ago for one telephone conversation only.

On trunk telephone circuits many thousands of valve amplifiers are used, the simplest handling only one circuit. Each valve consumes a watt or two of power continuously, and highly reliable power supplies of sufficient size must be provided, together with adequate ventilation to dissipate the heat. Transistors, each consuming less than 0·1 W, can replace the valves in the simpler amplifiers. Two experimental types of transistor amplifier were shown, one type, now undergoing a field trial, being suitable for single speech circuits. The other type is of higher performance and promises to be of use for music circuits.

Submerged Repeater Systems

Submerged repeaters offer the same great economic advantages as are obtained on land by repeater stations which may be spaced as closely as three miles along the cable route. Fault repairs on a submerged repeater system are, however, incomparably more difficult, lengthy and costly than on land systems and it is largely this factor which has accounted for the relatively slow and careful development of submerged repeaters. The shallow seas round Great Britain are favourable to submerged repeater schemes for communication with neighbouring countries, and enterprising work by the Post Office during the last 15 years has resulted in a network of submerged repeater systems round these islands involving more repeaters than exist in the rest of the world. The standard shallow water repeater provides 60 high-grade telephone circuits on one cable, in the frequency bands 24–264 kc/s in one direction of transmission and 312–552 kc/s in the return direction. The normal cable is an 0·62in polythene-insulated coaxial cable, and up to 10 repeaters if required can be inserted at about 20 mile intervals. The repeaters are energized in series from a shore station with a constant current of 0·3 A and each repeater absorbs about 250 V. A type of radar pulse gear locates any faulty repeater.

Confidence and experience gained on shallow-water repeaters has led to the development of a deep-sea type. Hydrostatic pressures of up to 4 tons/sq in presented difficulties, particularly in the sea cable glands which also had to withstand 2,500 V d.c. The Post Office has arrived at a very neat and efficient solution to this problem. The deep-sea housing has a streamlined cigar shape about 9ft long and 11in in diameter and is laid in line with the cable, as distinct from the much larger shallow-water repeaters which are lowered by a rope to the bottom. This type of repeater will be used to provide 60 circuits on the British section of the transatlantic telephone cable. The amplifier consists of two forward-amplifying paths in parallel, so that the failure of any component in one path will not seriously degrade the performance of the repeater.

Reliability of a standard never before attempted is required of these repeaters, and the aim is a life of 20 years. The construction of the hermetically sealed electrical units is carried out in air-conditioned rooms, under conditions of scrupulous cleanliness, with rigid inspection at all stages. Valves have inherently presented the most serious component problem, but intensive work has led to an efficient long-life valve, and it is accepted with confidence that the valves manufactured in the Post Office laboratories will meet the onerous requirements.

The Post Office "speaking clock," which was designed and built at Dollis Hill in 1936 and has provided the TIM service in this country since then, is controlled by a master pendulum. It receives hourly correcting signals from Greenwich and has a maximum error during each hour of 0·1 sec. Last week we saw the prototype of a new and more accurate speaking clock which is driven electrically from a quartz-crystal-controlled oscillator. This new clock keeps such good time that, even if the correcting signal from Greenwich is applied only once in every 24 hours, the maximum error will never exceed 0·005 sec. Continuity of power supply is vital in the operation of high-grade quartz clocks, such as are used in time observations. A failure may do much more than stop the clock for a short time; the temperature of the crystal controlling the clock has to be closely regulated and any gross disturbance of temperature, such as would be caused by a failure of the crystal-oven power supply lasting more than a few minutes, may impair the accuracy for many weeks. Quartz clock installations have therefore usually included elaborate and expensive emergency power supply equipment. A simple but effective scheme has now been devised in which the emergency power supply is drawn from an ordinary car battery.

Canadian Engineers in Britain

Thirty-seven Canadian engineering graduates recently arrived in the United Kingdom to take up Athlone Fellowships awarded by the British Government, and before dispersing to engineering firms, universities and colleges to begin their studies, the British Council arranged a short "introduction to Britain" programme in London, from 20th to 23rd September.

The graduates were welcomed by Sir Arthur Fleming, chairman of the Managing Committee for Athlone Fellowships, and talks were given on British social and economic structure, industrial relations and trade unions.

VIEWS on the NEWS

By REFLECTOR

Remarks upon the low thermal efficiency of the steam locomotive in last week's *Electrical Review* are underlined by a report of a complaint by an experienced engine driver of the poor quality of coal which is being supplied to the railways. This driver was concerned at the possible danger arising from the necessity for the men on the footplate to devote so much of their attention merely to keeping the engine running on inferior coal. A "spokesman" of the Transport Commission agreed that the railways had to accept poorer qualities than they would like to have and the engine did not "steam so well." This almost certainly means that the locomotive's already low efficiency is lower still. How much better it would be to let the power stations handle the low-grade coal and provide electricity for running the railways.

* * *

Life is complicated for the British Electricity Authority; when it is not being reproved by "amenity" organizations it finds itself up against protectors of bird life and particularly the Notts Co-ordinating Committee of Animal Welfare Societies. At a recent meeting of this body it was stated that during the past two years five swans had been killed and twenty others injured by collision with overhead lines. The secretary said that investigations had shown that the lines spanned a ballast hole at Long Eaton owned by British Railways. The Derby B.R. Estates Surveyors' Department had said that it was impossible to fill the hole and the B.E.A. considered it "technically impossible" to place markers on the lines. The Committee refused to accept these decisions and was supported by the meeting. Mr. C. G. Willett, secretary of the B.E.A. East Midlands Division, said that he had presented a report, after personal investigation, and this was being considered.

* * *

The *Faversham News* reports that a local "Olde Tyme Dance" was in full swing when the electric lighting failed recently. The dancers and the band carried on, however, and eventually candles and oil lamps were brought in. It is strange that such illumination should be regarded as an emergency measure at such a function.

* * *

There was a reference in the *Manchester Guardian* the other day to the electric lighting schemes of John Hollingshead, the theatrical manager, in the seventies of last century. A suggestion of his that local authorities might borrow batteries from the Royal Institution and light leading thoroughfares at about £1 per hour per mile was not taken up. Later Hollingshead endeavoured to acquire the "Jablochkoff candle" patent but was repelled by the price asked for it—£300,000. Instead he secured the Lontin system in France and imported wire, fittings and two electricians. Then in August, 1878, he astonished Londoners with the brilliancy of lighting all round the Gaiety Theatre. He obtained his power from a neighbouring newspaper office. I may say that the Jablochkoff candle had a vogue in this country. The first trial was carried out at the West India Docks in June, 1877; later it was installed elsewhere in London, including the Thames Embankment and Holborn Viaduct.

* * *

Fish and electricity supply appear to be inseparable. I have recounted innumerable examples of this affinity: the latest is dealt with in *British Electricity*. About five years ago the cooling tower pond at the Newton Abbot power station was cleaned out and in the process about 20 lb of flounders of various sizes were discovered; they provided a substantial meal for the cleaners. In the following year more of the fish were found but they were only about 6in long. It was decided as a matter of interest to study the growth of these fish and in 1953 some of them were labelled. A few of the labelled fish were recently recovered and were found to have doubled in length in a year; the normal annual growth is said to be 10 per cent. It seems that the flounders thrive in their warm surroundings, which makes me wonder why angling societies are so perturbed when the B.E.A. raises the temperature of rivers with its condenser water.

* * *

I have always thought that the "pay as you use" system employing prepayment meters was a boon and blessing to impecunious consumers and have argued against the compulsory changing-over to "quarterly" meters. Unfortunately there has been a chronic shortage of shillings in recent years and without shillings the prepayment consumer is stumped. One consequence has been an offer by the manager of the Coventry and District Sub-Area of the Midlands Electricity Board (Mr. F. A. Godden) to replace prepayment meters by quarterly meters, free of charge. I can only hope that this will not add to the difficulties of account collection.

* * *

Reproduced in the *Electrical Review* of 1st October, 1874, was a description by Monsieur C. Clamond, of Paris, of his improved thermo-electric battery. The thermo-couples constituting this device were iron and an alloy of zinc and antimony. Six of the thermo-couple bars were made up into a "crown" and connected in series. The crowns were placed one on top of the other and separated by asbestos washers. The whole formed a cylinder, with its interior luted with asbestos, heated by means of a refractory clay pipe pierced with holes. Gas mixed with air passed through the holes and was burned in the annular space between the tube and the bars. The battery was apparently used for electrodeposition and one model shown by M. Clamond was said to deposit 20 grammes of copper an hour.

I.E.E. Centre Chairmen

IN previous issues we have published biographical notes and portraits of the chairmen of the specialized Sections of the Institution of Electrical Engineers and of some of the chairmen of the provincial Centres. We now give below similar particulars of the chairmen of the remaining Centres.

MAJOR P. L. BARKER, R.E.M.E., B.Sc., chairman of the Northern Ireland Centre, is chief engineer of the Northern Ireland Region, G.P.O., Belfast. He was educated at Waverley Road Secondary School and Birmingham University, where he gained a first class honours degree in engineering in 1923. He entered the Post Office Engineering Department by open competition in 1924 and was employed at the Post Office Research Station, Dollis Hill (1925–35) on work connected with short wave radio propagation and transatlantic telephony and at the Wembley Laboratories (1936–40) on radio and television rediffusion. In 1940 Major Barker was commissioned in the R.E.M.E., and served in the 1st A.A. Division, Command Workshops, Aldershot, H.Q. Scottish Command and British Army Staff, Washington. He returned to the Post Office Engineering Department in 1945, and after a year in the Chester Telephone Area transferred to the Northern Ireland Region as chief engineer.

MR. A. R. BLANDFORD (South Midland) was educated at Walsall and Birmingham Technical Schools and received his electrical training with the Walsall Electric Co., with whom he became assistant manager in 1913. Three years later he joined the Electric Construction Co., Ltd., as assistant switchgear engineer, and in 1923 commenced his association with the English Electric Co., Ltd., in a similar position. He has since held the positions of assistant chief switchgear draughtsman (1927–28), chief switchgear engineer (1928–33) and chief engineer and manager of the Switchgear Department (1933–49), and since 1949 he has been chief electrical engineer of the English Electric Co. He represents the company on B.S.I. and B.E.A.M.A. Committees and is a British representative on the International Electrotechnical Commission. He is a director of the English Electric Export & Trading Co.

MR. E. A. LOGAN, M.Sc., M.I.Mech.E., M.I.C.E. (Southern) is manager of the No. 3 (Portsmouth) Sub-Area of the Southern Electricity Board. He received his education at Rutherford and Armstrong Colleges, and in 1921 became a research assistant in the Admiralty. In 1923 he was appointed assistant engineer with Merz & McLellan, and in 1929 became senior assistant mains engineer with the Yorkshire Electric Power Co. Four years later he went to the Mid-Cumberland Electricity Co. as chief engineer. From 1936 to 1946 he was engineer and manager of the Erith Corporation electricity undertaking, and then went to Burma as manager and chief electrical engineer of the Government Electricity Supply Department and secretary to the Hydro-Electric Survey Board. While he was in Burma he was responsible for the restoration of war-damaged electricity supply undertakings and organized surveys of hydro-electric projects; he was also secretary to the Committee which prepared the Bill to nationalize electricity supply in Burma. This work was terminated by the armed insurrection throughout Burma. Mr. Logan took up his present position with the Southern Electricity Board on his return to this country in 1948. He has contributed many articles to the technical Press, principally on the transmission and distribution of electricity from hydro-electric work.

Mr. E. A. Logan

Mr. A. N. Irens

Major P. L. Barker

Mr. A. R. Blandford

Mr. J. S. Hastie

MR. A. N. IRENS, M.Amer.I.E.E. (Western) was educated at Blundells and Faraday House, and spent his last Faraday House year with the Metropolitan-Vickers Electrical Co., Ltd., at Trafford Park, Manchester. After a further year with that company, he joined the General Electric Co., Ltd., at its Leeds office as sales engineer in 1933. Mr. Irens was appointed deputy chief electrical engineer of the Bristol Aeroplane Co. in 1939 and took up his present position of chief electrical engineer to the company in 1943. He also acts as a consulting engineer, in which capacity he has carried out work for the Government and other organizations. He is a part-time member of the South Western Electricity Board and is a past chairman of the Utilization Section of the I.E.E.

MR. J. S. HASTIE, B.Sc.(Eng.), M.Amer.I.E.E. (Scottish) is a director and technical manager of Scottish Cables, Ltd. He received his technical education at Glasgow University where he graduated in 1926. He served a "sandwich" apprenticeship with Fraser & Borthwick, Ltd., Glasgow, and in 1928 was appointed chief technical assistant to Enfield Cable Works, Ltd., where he was mainly concerned with research and the development of high voltage cables. In 1933 Mr. Hastie joined Johnson & Phillips, Ltd., as chief cable technician and three years later was also appointed manager of the Condenser Department. He joined Scottish Cables, Ltd., in 1937 and was elected to the board of the company in 1945. He was chairman of the South-West Scotland Sub-Centre of the I.E.E. for 1952–53.

Approved Street Lighting Columns

THE Ministry of Transport requires that where street lighting on trunk roads receives a contribution from central funds, the columns used are of a design approved by the Council of Industrial Design or passed by one of the Royal Fine Art Commissions. The latter formerly held the responsibility for examining them but requested the Ministry to invite the Council of Industrial Design to take over the task of advising manufacturers and of maintaining a record of approved designs. A Street Furniture Committee was accordingly set up in January, 1952, under the chairmanship of Mr. W. J. Worboys, B.Sc., D.Phil.

There are now some 300 new designs on the approved list and the manufacturers have agreed to withdraw progressively from production columns originally passed by the Commissions which are now not acceptable. Last week a list of approved designs was circulated to more than 2,000 local authorities all over the country.

Commercial Motor Show

First 30ft Long Two-Axle Trolley-Bus

BECAUSE of their eminent suitability in their own fields it was disappointing to find such a comparatively small number of electrically driven vehicles on view at the Commercial Motor Show which until to-morrow evening is being held at Earls Court, London. What they lack numerically, however, they make up for in interest in other directions.

A somewhat revolutionary advance in commercial transport is represented by the development of a Sunbeam two-axle double-deck trolley-bus 30ft in length and carrying sixty-eight passengers instead of fifty-six in a two-axle bus of normal design. Completed only last week, this is the first two-axle trolley-bus allowed to be built with an overall length exceeding 27ft and the modification not only reduces weight and therefore the initial cost but also results in a considerable saving in maintenance charges. Another innovation incorporated in this bus is electrically-operated automatic acceleration, which makes for safe and smoother travelling. The B.T.H. 95 h.p. motor is of the flood-proof type. Fifteen of these trolley-buses have been ordered by the Walsall Corporation.

Shown for the first time on the British United Traction stand is a two-axle type single-deck trolley-bus designed to carry a hundred passengers. Designed chiefly for service overseas, where the trend to trolley-buses is considerable, this vehicle is fitted with a hydraulic automatic acceleration device and power-assisted steering. It is also equipped for battery manœuvring and has a master controller fitted under the driver's seat. The English Electric 150 h.p. compound-wound, non-regenerative traction type motor is arranged for rheostatic braking.

The latest developments in mobile shop and delivery vehicle design are represented by Smith's Delivery Vehicles two ton N.C.B. battery-driven grocery shop, a one ton "Commuter" baker's shop, a 25 cwt "Percheron" three-wheel chassis for delivery vans, and a 30 cwt food delivery vehicle, one of several ordered by the Uruguayan Ministry of Health. Hindle Smart & Co.'s "Help Mate" battery vehicle for local delivery work incorporates "Elexmatic Pack" two-speed (front and reverse) controllers claimed to reduce the size and weight of the battery required by nearly two-thirds. An "Electrojan" 60 V 8 h.p. electric drive can, if desired, be substituted for the petrol engine in the Trojan 15 cwt goods van shown.

In all classes of vehicles, not only the electrically operated ones, a particular aspect of design has been receiving the special attention of the manufacturers, namely the comfort of the driver. Electricity is involved in many of these amenities which include such items as heaters, de-misters and de-frosters.

Much more extensive use is now being made by commercial vehicle manufacturers of the built-in headlamp incorporating recent advances made in illumination engineering. Rear lighting too has also been greatly improved technically as a result of the requirements of the new Regulations. The flashing type of direction indicator is also becoming popular in commercial vehicles.

Attention is focused on the new Regulations by the centrepiece of the Lucas stand which represents the tail end of a commercial vehicle and shows up effectively the latest rear lamps and reflectors. Flashing indicators, miniature auxiliary driving lamps and a more powerful windscreen wiper are among new Lucas products forming separate exhibits. Trico-Folberth, Ltd., also show new flashing light signals specially designed for public service vehicles, together with new single and twin note air pressure horns for commercial and passenger carrying vehicles. The "Catseye" combined stop and tail lamps, shown by Tudor Accessories, Ltd., are of a novel design.

In the "His Master's Voice" coach radio and passenger address system displayed by S. Smith & Sons (Radiomobile), Ltd., the coach operator can install both services together or one separately and add the other later if desired. In addition to car radio equipment Pye, Ltd., make a special feature of radio-telephone equipment suitable for taxis or commercial firms employing fork lift trucks, vans, etc.

One of 15 two-axle 30ft Sunbeam trolley-buses ordered by the Walsall Corporation

Principally with the object of providing improved starting performance with less weight and bulk a large number of new commercial vehicle batteries have been developed, the manufacturers concerned including Crompton Parkinson, Ltd., Joseph Lucas (Electrical), Ltd., Nife Batteries, Peto & Radford, Chloride Batteries, Ltd., Oldham & Son, Ltd., Park Bros., Ltd., Tungstone Products, Ltd., and C.A.V., Ltd. The last-mentioned company shows both lead-acid and alkaline types.

For charging batteries a new range of Westinghouse "Westalite" units has outputs ranging from 12 to 2,400 W. In addition to "Portostart" equipment for starting vehicles of all sizes, Crypton, Ltd., is showing an improved self-contained motor analyser, a new series of portable testing instruments and a new "Genareg" test bench. A heavy duty precision valve refacer is a new Wolf development, while new spot welding equipment is shown for the first time by the A.R.O. Machinery Co., Ltd. The Service Electric Co., Ltd., introduces new "Car Valet" and "Secomak" vacuum cleaners for public service vehicles.

Machine Tool Exhibition

THE next International Machine Tool Exhibition, organized by the Machine Tool Trades Association, will be held at Olympia, London, from 15th to 29th June inclusive, 1956. No other international machine tool exhibition will be held in Europe during that year. In addition to members of the permanent staff of the Machine Tool Trades Exhibition the following are members of the organizing committee for the 1956 exhibition: Messrs. H. P. Potts (chairman), B.S.A. Tools, Ltd.; Robert W. Asquith, William Asquith, Ltd.; T. Bolton, W. S. Crawford, Ltd.; W. Core, Alfred Herbert, Ltd.; J. Frye, Victoria Machine Tool Co., Ltd.; H. J. D. Kearns, H. W. Kearns & Co., Ltd.; J. G. Petter, Cincinnati Milling Machines, Ltd.; J. F. Phillips, Universal Grinding Wheel Co., Ltd.; R. D. G. Ryder, Thomas Ryder & Son, Ltd.; J. G. Sagar, J. Sagar & Co., Ltd.; J. C. Snow, Snow & Co., Ltd.; and the hon. treasurer of the Machine Tool Trades Association.

15 MeV Linear Accelerator

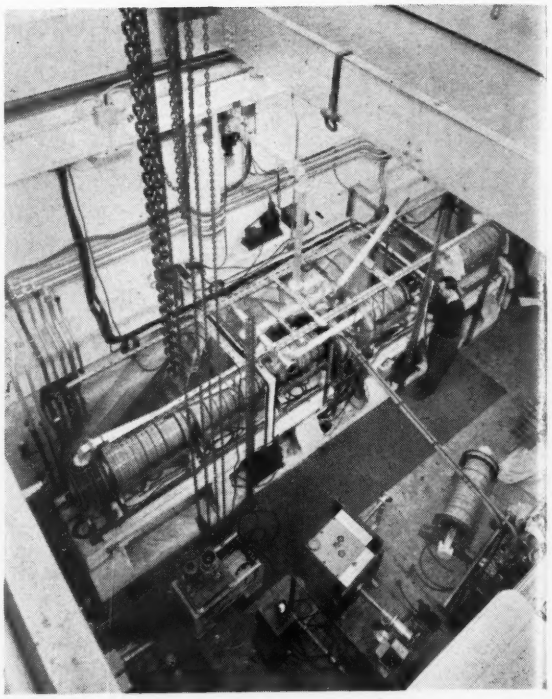
World's Most Powerful Machine for St. Bartholomew's Hospital

The development and construction of a 15 MeV travelling wave linear accelerator for the Physics Department of St. Bartholomew's Hospital College, London, has just been completed at the Mullard Research Laboratories, Salfords, Surrey. The machine is being acquired for treating patients, but during the first few years it will be used entirely for fundamental investigations into the action of radiation on living tissue and on the best methods of the treatment of cancer.

The new accelerator is claimed to be the largest and most powerful of its kind for medical purposes anywhere in the world. The only comparable accelerator in existence is another 15 MeV machine, also made by Mullard, at the Atomic Energy Research Establishment, Harwell, where it is used exclusively for nuclear physics research.

Fundamentally, the 15 MeV linear accelerator is a source of high-energy electrons. Usually, these electrons are made to strike a metal plate, producing high-energy X-rays which are used for the treatment of deep-seated tumours. Used in this fashion, it is a source of X-rays at least four times as intense as any at present known to medicine. In addition, the St. Bartholomew's accelerator is so designed as to make it possible to use the beam of 15 MeV electrons directly for treatment. The therapeutic value of high-energy electrons has only recently been demonstrated, and has many advantages over high-energy X-rays in the treatment of certain types of tumours. A third use of the accelerator will be as a source of fast neutrons, the effect of which on living tissue has yet to be investigated. The neutrons are produced when electrons are made to hit a uranium target.

The new machine may be expected to assist greatly in the investigation of malignant growths, and eventually in their treatment. Similar machines of much lower power are already in use for radiotherapy in two hospitals in the United Kingdom, and so far the results have been encouraging. Although the Mullard 15 MeV accelerator has been designed so that it may easily be used for radio-therapy, its preliminary use at St. Bartholomew's will be for research rather than treatment.



15 MeV linear accelerator under construction at the Mullard Research Laboratories

Railway Electrification in Spain

IN March, 1950, the English Electric Co., Ltd., received a contract for sixty 3,600 h.p. electric locomotives for the Spanish National Railways for use on lines to be electrified in the mountains in the north of Spain, forming part of a comprehensive reconstruction plan.

The first locomotives, the mechanical parts of which were built by Vulcan Foundry, Ltd., were delivered in June, 1952, and there are now about forty of them in service. They have been hauling passenger trains and heavy mineral traffic on the Ponferrada-Branuelas section of the route from Madrid to Corunna, and on the Ujo-Busdongo section of the route from Madrid to Oviedo. Both these sections have long continuous stretches of 1 in 50 gradient with numerous curves and tunnels, and are subject to heavy snowfalls.

A third section was recently opened for electric traction from the popular resort and port of Santander to Reinosa, an important steel-making town some 50 miles south on the main line to Madrid. This scheme is designed to solve the difficult problem presented by the Cantabrian mountains, increasing the capacity of the line and reducing appreciably the journey time of the trains. The opening ceremony was performed by the Minister of Public Works, Count Vallellano, and was attended by a number of high officials; the English Electric Co. was represented by Mr. C. M. Cock, general manager, Traction Department, Mr. G. W. Barlow, resident traction engineer in Spain, and Mr. J. G. Blackburn, of the Export Department.

The next stage of electrification to be completed in this programme will be in the province of Asturias where the lines radiating from Oviedo carry dense coal traffic and this should be completed this year. By the end of 1955 the English Electric locomotives will be running over 315 track miles of the newly electrified line in the north of Spain.

Aircraft Electrical Systems

THIS year's vacation school organized by the Electrical Engineering Department of Imperial College, London University, was on "Aircraft Electrical Systems." It commenced on 20th September with an opening address by Sir Frederick Handley Page, C.B.E., Hon.F.R.Ae.S., F.C.G.I., who said that applied science was often regarded as excessively vocational and criticized industry for sometimes seeming impatient of long-term research. He felt all fundamental research to be of more than academic interest in so far as it was ultimately capable of useful application.

After drawing attention to electrical and aeronautical engineering as being the two newest branches of the art, he referred to the interesting problems which had arisen as they had progresively merged, and to the need for closer liaison between members of those branches for more efficient design and progress. There was a need for electrical manufacturers to be one stage ahead of aircraft designers, so that new electrical schemes might be developed in tried aircraft, and vice versa, to the betterment of both.

AUTOMATIC DIGITAL COMPUTATION

Recent Developments Reviewed

A COMPREHENSIVE review of progress in a relatively new field is afforded by the proceedings of the international symposium on automatic digital computation, held at the National Physical Laboratory last year, which have now been published at 21s by H.M. Stationery Office for the Department of Scientific and Industrial Research.

As Professor D. R. Hartree, of Cambridge University, pointed out in his opening address, it was possible five or six years ago for someone interested in the subject to know something of most of the main projects in this field in the world. To-day, it would be virtually a full-time job to keep in close touch with all that was going on in Great Britain alone.

Eight British machines were described during the first part of the symposium. Subsequent papers were grouped under the headings of programming, design, utilization, circuitry and hardware, servicing and maintenance, and medium size digital computing machines.

Gates and Trigger Circuits

In his paper on " Gates and Trigger Circuits," W. W. Chandler (Post Office Research Station, London) briefly summarized findings on MOSAIC and other electronic machines. The generalized gate circuit is a device which, supplied with signals from " N " sources, will itself provide a signal if " X " or more of the input leads are simultaneously stimulated, where X may have values from 1 to N. If X = 1, the device may be called an " OR " gate; if X = N, it may be called an " AND " gate. The obvious way to provide a " gate " facility is by a multiple potentiometer system. The drawbacks of such an arrangement are:—(1) Reduction of level in output signal relative to input—directly proportional to N. (2) Variation and instability with time, of available resistors. (3) The fact that such an arrangement draws current from the original source, and thus cannot be repeated often on any one signal busbar. The first of these objections is usually decisive in very high-speed machines, where available voltage swings are in any case low due to the necessity for low time-constants.

Improvement may be effected by the use of diodes (thermionic or crystal) provided that the gate is an " OR " or an " AND " gate. Voltage swings are then transmitted with very little reduction, but a load, albeit a small one, is still thrown on the sources of signals. To avoid even this trouble, it is necessary to use some scheme whereby each input lead is terminated on a separate valve, or at least on a separate electrode. Thus there are the techniques using the control and suppressor grids of a pentode (satisfactory if a signal sufficiently large to swing the suppressor is available), feeds on several valve grids, the anodes of the valves being commoned (in which case amplification, phase reversal and change of absolute level results) and feeds on several valves connected as cathode followers with common cathode (in which case level and phase are retained but amplitude may be slightly reduced). In all types of circuit, it is usually necessary, and always desirable, that the gate shall be either of " AND " or " OR " type.

Many types of binary trigger circuit are available. In general, Chandler prefers the symmetrical type of circuit, in which each anode feeds the opposite grid, the two cross-feed circuits being identical. The " ON " and " OFF " signals are of exactly the same kind, the two half-circuits are independent and can therefore be separately tested, the circuits themselves are very easy to design and appreciate, and the input signals can be specified with respect to fixed voltages.

It is desirable to separate the operating connections from the internal (or stabilizing) connections. The obvious solution is to use pentodes, stabilizing on the control grids and switching on the suppressors. The advantages are held to justify the increased number of separate valves. The upward swing of the control grids is limited by grid current. If the downward swing is also limited by diode clamps connected to a voltage just below cut-off—a trigger is obtained which is sensitive to small and short duration input signals, and is unaffected in speed of operation by wide variation in the resistors constituting the cross-feed networks (providing that the latter give stable d.c. conditions). An essential part of the circuit is an additional condenser feed from each anode to the opposite grid giving an a.c. coupling effect. Triggers of this type can be made to respond to a few milli-microseconds. The output should be taken from a buffer valve, so that the output circuit may be designed independently of the internal circuit parameters.

Parallel Ferroresonant Circuits

A systematic investigation of the parallel ferroresonant circuit was described by Professor J. G. Santesmases (Spain). In a circuit made up of a resistor, an air-core inductance and a capacitor in series or parallel, currents are completely determined if the applied voltage is sinusoidal. If an iron core is substituted, the aspect of the problem is changed and the inductance becomes a function of the current. Whenever this element is present in a circuit, an accurate study of the circuit becomes difficult because of the distortion which the core introduces in the voltage or current waveforms. Under certain conditions, two stable states can be obtained. This phenomenon is termed ferroresonance. It can occur in the series circuit (different current for the same voltage) or in the parallel circuit (different voltages for the same current).

Some parallel ferroresonant trigger circuits have been designed and the experimental results have been successful. In a series of tests carried out at Madrid, using cores made of ferrites, a carrier frequency up to 1 Mc/s and a pulse rate up to 150 kc/s were achieved. About 4 d.c., 1·3 a.c., and 0·5 ampere-turns per cm of current pulses are used.

Mercury delay line storage was the subject of a paper by M. Wright (National Physical Laboratory), who emphasized the reliability of this system. A storage system, it was stated, can be assessed in respect of three major features: Cost, reliability, and speed and access time. Based on experience with the ACE pilot model, an attempt was made to assess the advantages of m.d.l. storage. The initial cost is fairly high, but this is relatively unimportant. That of a complete mercury delay store, as in the ACE pilot model, is estimated to be about £10 per word of 32 digits or about 7s per digit. Two-thirds of this cost is for circuitry and the other third for the delay lines themselves.

The easiest way of analysing the reliability of any

storage system is to consider its possible faults. In general these can be divided into four classes:—(1) Complete and continuous breakdown. (2) Breakdown for certain pulse patterns only. (3) Random pick-up. (4) Intermittent breakdown of the types (1) or (2).

Mercury delay lines are free from (2) and can be made free from (3). They offer the important advantage that they can readily be operated at signal levels such as to render them practically immune from faults represented by the loss or pickup of pulses. In the absence of any specific and readily identifiable maladjustment, or any mechanical defect such as a faulty plug-and-socket connection, experience has shown that the storage system neither gains nor loses a single digit, even in the longest runs. Finally, it is free from any limitation on the number of times that stored information can be read. The working life is not yet known with certainty. In the pilot model, four long lines and nine short ones of the latest type have been working for about a year without any replacement.

M.d.l. storage can be used at very high pulse repetition rates; i.e., at very high digit frequencies. A practicable upper limit is set by a number of factors; e.g., crystal strength, temperature control requirements, attenuation, and some features of associated circuitry, in particular circuit delays. It appears that 5 Mc/s is about the highest frequency that could be realized in the present state of the art. This would require a carrier frequency of about 30 Mc/s. So far as access time is concerned, it does not offer the possibility of direct access to required words, but a suitable logical design and the use of optimum coding enables the effective access time of a delay-line cum magnetic-drum system to be reduced to that of a single-word delay line.

Magnetostriction Delay Lines

Applications of magnetostriction delay lines were reviewed by R. C. Robbins and R. Millership (Elliott Bros., Ltd.), who claimed that for use in digital computers lines of the type described in their paper had considerable advantages over the other forms of delay line which have been used. The magnetostriction delay line is an acoustic line, in which the input electrical energy is converted into an elastic wave, which then travels along the line and is reconverted into electrical energy at the output.

The authors reach the conclusion that mercury delay lines are probably the most likely choice for digit frequencies higher than 1 or 2 Mc/s, though for small capacity storage the electromagnetic delay line used in conjunction with transistors seems a probable rival. The magnetic drum is probably the inevitable choice for non-volatile storage capacity greater than about 100,000 digits. Again, cathode ray storage meets the requirements for rapid access storage of medium capacity.

It might seem that the field is well covered by well-proved techniques. On the other hand, magnetostriction line storage is relatively cheap and simple to construct, the circuits are simple, and it can be almost unaffected by temperature. It is suitable both for small capacity rapid access storage and for medium capacity long access storage, and it can be used in conjunction with large capacity magnetic drum storage without any special means for digit conversion.

With mercury delay line storage, one can synchronize the drum to a line, but it is necessary then to keep all lines of the delay storage system at nearly the same temperature. Using magnetostriction storage, the drum can be synchronized either to a crystal or to a line, and temperature changes need have little effect.

Where only medium capacity long access storage is required, long line magnetostriction storage may well appeal to those who deprecate the use of rotating machinery.

The argument in favour of using the type of storage system possessing the simplest and least number of types of circuit, probably weighs more heavily in the case of the small capacity rapid access store. A rapid access store for about 30 words, using magnetostriction store packages of the kind described in the paper, would require a total of about 200 valves, slightly over half of which would be associated with address finding. This is four or five times the number required by the equivalent c.r.t. store, but the system would use only one type of package differing from those used elsewhere in the computer. Servicing should therefore be considerably simplified.

Two further considerations are worth mentioning. The rapid access magnetostriction store can probably work up to two or three times the digit frequency practicable with a c.r.t. store, but not much higher. It has no "read-around-ratio" limitations and no time is lost by need for regeneration. The useful signal level at the output of a short-magnetostriction delay line at 330 kc/s is between 40 and 50 db higher than that appearing at the signal plate of a c.r.t. store at the same frequency.

C.R.T. Storage

The practical application of cathode ray tube storage to a machine now being built at Manchester University was described by T. Kilburn. The machines built in recent years at Manchester have operated completely in the serial mode. The statement that parallel machines are preferable because they have more identical units is not thought to be of much importance, since the total number of units is greater. Further, it is thought that parallel machines tend to be inflexible, since the high cost of parallel registers leads to the provision of only a limited number of them.

The consequent bias towards serial operation has been unfortunate for c.r.t. storage, since the rapid access feature of this type of store is only partially exploited in a serial machine. However, experience has shown that the minimum capacity required of a rapid access store is about 10,000 digits, if flexibility of programming is to be retained, and if the time for transfers from intermediate to rapid access stores is not to become too large. Since 10,000 digits, or about 10 c.r.t.'s, are essential, it is no longer a question of saving equipment but of arranging essential equipment to the best advantage. Undoubtedly, considered from the point of view of the c.r.t. store alone, a parallel arrangement is to be preferred, since speed is achieved without extra cost.

With a parallel store postulated, it was desirable to operate serially at such a speed that the increased speed obtained from the parallel c.r.t. store was not squandered. This called for a digit frequency of 1 Mc/s. This frequency, suitable for the computing circuitry, was too high for registers to be provided in terms of serially operated cathode ray tubes, which in any case are expensive. The answer to this problem was delay lines.

The methods described in the paper are operating successfully, though the most stringent testing will occur only when the machine itself is complete. The maxim theoretical ratio of 1,024 has been obtained experimentally, 512 with some degree of certainty, and 256 with what is thought to be complete certainty. Since the maximum read-around ratio which will ever arise in practice is 228, no difficulty is expected.

The association of cathode ray tubes and electrical delay lines has met with considerable success. It seems reasonably certain that the speed of the final machine will require, when other factors are also taken into consideration, less than half the number of valves used in the present machine.

E.I.B.A. Annual Meeting

Report and Election of Officers

THE annual general meeting of the Electrical Industries Benevolent Association was held on 22nd September, Sir John Dalton (president) taking the chair.

Sir John, in asking Mr. H. A. Deacon (chairman of the Court) to present the report and accounts, expressed his thanks to the members for attending, many of whom had had to travel long distances. He referred to the increasing obligations which the Association had to face, and said that he felt the industry was not doing as much as it should. The membership was small when compared with the number employed in the industry and the aim for the future should be more members.

Sir John Dalton

Mr. Deacon, in moving the adoption of the report and accounts, said that last year the demands for help were greater than ever before, and 782 people received assistance from the Association, an increase of 24 per cent; if their families were included a total of 1,770 had received a helping hand.

An interesting point was that the increase in the Association's work had been mainly taking place among cases which, either in their nature at the outset, or because of what the E.I.B.A. was able to do to get them help from other sources, did not finally make demands on the Association for direct money grants. This was a good sign, as it indicated that the comprehensiveness of the Association's responsibilities was getting more widely known. This work placed a heavy extra burden on the Association but they looked forward to the time when they would have found satisfactory increased accommodation, so that it could have adequate staff to deal with these matters. The past year had been one of steady progress and the Association had taken two more places in homes for the infirm aged run by the Crossways Trust, which would be used for people who were too ill to be accommodated at Broome Park. Mr. Deacon expressed the indebtedness of the Association to all those in the industry who had assisted the Association in its good work, and particularly mentioned the branch officers and the committee members. Mr. A. E. Page seconded the motion which was adopted.

The retiring members of the Council were re-elected and the following additional members were elected: Messrs. H. Bishop, J. Eccles, R. E. V. Ely, D. G. Lindsey, F. Long, A. E. Page, J. H. Scott, J. Smellie and H. H. Young.

At the Council meeting which followed, Sir John Dalton was unanimously re-elected president for the ensuing year. Mr. Deacon in proposing his re-election mentioned that the golden jubilee of the Association would occur during the year, and the selection of the president was more important than in an ordinary year, they had therefore decided to ask Sir John to remain president.

Sir John, in acknowledging the honour, said that he would be going to Australia in November and would be away for about three months, but he hoped to visit a number of the branches before he left.

The report for the past year refers to some of the typical cases in which the Association has been able to give valuable help, and mentions that accommodation at Broome Park has been extended by utilizing South Lodge. Referring to the need for increased membership special mention is made of the membership campaign of the Hampshire Branch, in the first three months of which 197 new full members from the B.E.A. Division alone were obtained; the total branch membership has risen from 80 to 277, and the branch has set a target of 1,000 full members.

The accounts for 1953 show that the income was £59,384, as compared with £56,116 for 1952. Expenditure totalled £55,574 (against £50,277), leaving a surplus of £3,511 (£5,839).

Electrical Research

AMONG the recently issued publications of the E.R.A. is Report Ref. G/T275, "Gas-Blast Circuit-Breakers. Effect of Arcing on the Mass-Flow of Air Through the Nozzle and on Nozzle Pressure" (Third Progress Report), by A. A. Hudson, B.Sc., Wh.Sc. (E.R.A., Thorncroft Manor, Dorking Road, Leatherhead, price 12s 6d), a progress report on the study of air flow in circuit breakers, which carries the work reported in Ref. G/T234, Ref. G/T255 and Ref. G/T262 a stage further. Experimental results are given on minimum mass-flow through, and pressure developed in, a nozzle, during the first half-cycle of arcing, under varying conditions of current, nozzle diameter, arc chamber pressure, lower-vertical gap and rate of rise of restriking voltage.

The minimum mass-flow during the first half-cycle of arcing is shown to be a function of current, nozzle diameter, and arc chamber pressure, and it is clear from the results that there exists a critical value of this function, which represents the transition condition from failure to clearance. The relationship between the critical value of this function, the lower gap, and the r.r.r.v., respectively, is given. The possibility is discussed of applying these results to conditions outside the range covered in the tests.

Fuse Temperature Rises

The object of the investigation described in Report Ref. G/T283, "Factors Affecting the Temperature-Rise of Fuse Terminals, for 100 A Fuses with Cartridge Fuse-Links," by H. W. Baxter, B.Sc., M.I.E.E., and M. T. Cree, A.M.I.E.E. (price 10s 6d), was to assess, as far as possible, the relative importance of the various factors that need to be considered in testing fuses for temperature-rise, so that the conditions to be observed in making a temperature-rise test may be accurately prescribed.

The process of measuring the temperature-rise of a fuse terminal necessitates that the fuse shall be wired with a cable of appropriate size. The current rating of a cable depends on the method of installation and, according to the way it is run, the cross-sectional area of a cable of a required current rating can vary by a factor of nearly two. Although this report is not concerned with the current rating of cables, it does show to what extent the cross-sectional area of the cable is significant in its effect on the temperature-rise of the fuse terminals.

In trying to assess how a fuse would behave when correctly wired, it has been assumed that a fully loaded cable would have a temperature-rise in the core of 70 deg F, since this is the figure on which the current-ratings of paper-insulated cables are based. The permitted maximum temperature-rise of fuse terminals (see B.S. 88 : 1952) is 46 deg C, and the test clause specifies that the conductor shall be so disposed and covered, or lagged, that the temperature-rise of the conductor at all points up to 1ft from the terminal shall be approximately, but not less than, 85 per cent of the temperature-rise of the terminal.

INDUSTRIAL NEWS

Electrical Engineers' Exhibition

All space has now been booked for next year's Electrical Engineers' Exhibition to be held at Earls Court from 15th to 19th March. The whole of the ground floor (250,000 sq ft) has been allocated and this represents over 50 per cent more space than for the 1954 exhibition. Even the space set aside for the Exhibitors' Club is now to be used to accommodate stands and the Cromwell Hall is being taken over to serve the Exhibitors' and Overseas' Visitors Club. Mr. P. A. Thorogood, the general manager, is now contemplating whether as far as the 1956 exhibition is concerned, it will be necessary for him to suggest that positions be decided by ballot and also the size of stands. If demands for space are maintained, then it may be necessary for additional space to be made available on the first floor.

Plumber Jointers' Wages

The Standing Joint Committee on Plumber Jointers of the Joint Industrial Council for the Electrical Cable-making Industry has agreed terms of settlement of the application of the trades unions for an increase in wages to plumber jointers and to other grades coming within the scope of the Plumber Jointers' Agreement. It has been agreed that the rates of pay of plumber jointers, both in London and in the rest of the country, shall be increased by 1d per hour. Consequential increases will be made in the rates of pay of plumber jointers' mates, of learners and probationers and of youths and boys. The increases are effective as from the beginning of the first full pay period following 23rd September. With the addition of the above-mentioned increases the new rates of pay for plumber jointers is 4s 1¼d per hour in the London area, and 3s 9⅞d per hour throughout the rest of the country. With regard to the new rates for plumber jointers' mates, it has been further agreed that at 85 per cent of the plumber jointers' rates these shall be as follows:—In the London area, 3s 5⅞d per hour; throughout the rest of the country, 3s 2¾d per hour.

A.E.I. Acquires Birlec

The Mond Nickel Co., Ltd., on behalf of its parent company, the International Nickel Company of Canada, Ltd., announces that following negotiations between Associated Electrical Industries, Ltd., Mond and Birlec, Ltd., the sale by Mond of its wholly-owned subsidiary Birlec to A.E.I. has been agreed. Birlec will operate as an individual company within the A.E.I. Group. Mr. George P. Tinker will continue as managing director and Mr. T. G. Tanner and Mr. J. H. Crossley as executive directors.

Bulawayo Trade Commissioner

The Board of Trade announces that a new Trade Commissioner office will be opened in Bulawayo, Southern Rhodesia, on 1st October. Mr. J. Stafford, assistant to the United Kingdom Trade Commissioner at Salisbury, Southern Rhodesia, will be in charge of the new office. The temporary address is c/o Mr. J. A. Clark, P.O. Box 1776, 516, Bradlow's Buildings, Abercorn Street, Bulawayo. There will not now be a United Kingdom Trade Correspondent at Bulawayo.

G.E.C. Household Equipment Showroom

Prospective customers can view products and seek expert advice on their requirements in a new showroom for household equipment opened by the General Electric Co., Ltd., on the ground floor of Magnet House, Kingsway, London, W.C.2. The showroom is designed in contemporary style, and a large selection of equipment, some 100 items including bulky cookers and refrigerators, is on display without appearing overcrowded. This has been done, in the main, by careful presentation of individual units in specially planned recesses and display areas, leaving plenty of room for the visitor to move around. Because the showroom itself is the attraction window floors have been left mainly free of equipment so that attention is directed to the inside.

A view through the window of the new G.E.C. showroom for household appliances

A feature of the showroom is a large colour-changing lighting fitting suspended from the ceiling. This demonstrates the potentialities of a colour changing cold cathode fluorescent lighting installation.

Illumination Design Course

The sixty-ninth illumination design course to be held by the E.L.M.A. Lighting Service Bureau commences on 1st November at 2, Savoy Hill, London, with a lecture on "Comfort in Lighting" by Mr. E. B. Sawyer, manager of the Bureau. The remaining six lectures to be given on the following Monday evenings will cover "Discharge and Fluorescent Lamps," "Colour," "Lighting Design," "Offices and Libraries," "Shops" and "Lighting for Enjoyment."

Northern Flexible Centre

Next Wednesday Mr. Ian M. Horobin, M.A. (Conservative M.P. for Oldham East), will open the Compoflex Co.'s Northern Flexible Centre at Huddersfield Road, Oldham, where advice will be available on all types of flexible tubes for industry. A similar centre was opened at 26, Grosvenor Gardens, London, in 1952.

Valuation for Purchase Tax

Notice No. 79 (Purchase Tax—Determination of Wholesale Value) issued by the Commissioners of Customs and Excise has been revised and copies are being sent to all traders registered for Purchase Tax purposes. The new notice incorporates the changes in the definition of wholesale value which come into effect on 1st January.

British Productivity Council

The British Productivity Council's progress report for 1953–54 states that ninety-four local productivity committees have so far been set up, as well as a work study unit. Apart from various publications and other publicity issued, the Council has made, for television use, a series of six films under the title "There's Always a Better Way."

Change of Address

The address of the Electric Discharge Lamp Auxiliaries Council is now 68, Victoria Street, London, S.W.1. The telephone number (Victoria 0328) is unchanged.

Belfast Plant Contracts

The Northern Ireland Government announced last week that with the approval of the Ministry of Commerce, the chairman of the Northern Ireland Joint Electricity Committee had decided to award a contract, worth about £738,000, for one 60 MW turbo-alternator for the second extension of the Belfast West power station to C. A. Parsons & Co., Ltd., and another contract for two 220,000 lb/hr boilers, to Mitchell Engineering, Ltd. This is for about £704,000. A contract for the main excavation and piling, about £36,000, is to go to Stewart & Partners, Ltd., Belfast.

Labour Costs and Electrical Development

The effect of increasing labour costs in retarding electrical development was mentioned by Mr. H. E. Wright, chairman of the Ipswich and District Electrical Association, in his address at the opening meeting of the session. He said that the cost of labour had reached a stage where its effect on the price at which electrical installation work could be carried out was making it increasingly difficult for the public to have the facilities they would like, and which should be within their scope, so that the fullest use could be made of electricity.

Burmese Rural Electrification

The Aluminium Wire & Cable Co., Ltd., is supplying 1,600 miles of steel-cored aluminium conductor for the first stage of an extensive rural electrification scheme in Burma. This conductor will be erected by Crompton Engineering Co. (Madras), Ltd., on the Pegu–Myingyan and Pegu–Allanmyo sections of a new 33 kV grid system which will be fed by diesel power stations.

Parnall (Yate) Pantechnicon

The above photograph shows an articulated pantechnicon which Parnall (Yate), Ltd., has recently put into service. The trailer unit of this vehicle was specially made to the company's design and the twin decks can be removed so that the unit can be utilized at any time for carrying goods other than washing machines. Steel sections of framing of special construction, with side pillars of shallow depth, have been incorporated in the design to enable four washing machines to be carried across the vehicle and still maintain the overall maximum width of 7ft 6in allowed by the Road Transport Act. The total number of washers which can be carried is 115. The purpose of the vehicle is to convey bulk quantities of appliances from the factory at Bristol to the northern distributing depot at Bradford.

Parnall (Yate) trailer unit

Two-millionth London Telephone

Last week the Postmaster-General (Earl de la Warr) presented to Lord Alanbrooke, Constable of the Tower of London, a "golden" telephone set —the two-millionth telephone to be installed in the London Telecommunications Region. The P.M.G. gave some details of telephone progress since the war, including the opening of 51 new exchanges in the London Region; the laying of two million miles of telephone wires in the Region; and the doubling of the number of telephones in the United Kingdom (now about six million). He said that within the next twelve months 14 new exchanges would be opened in London. It was hoped to reduce the waiting list from 376,000 to 100,000 in the next three years.

Revo Demonstration Kitchen

A well-equipped demonstration theatre has recently been completed by the Revo Electric Co., Ltd., at its Tipton factory. This is designed to seat 72 persons, and is fitted with a demonstration stage at one end complete with a sink unit and built-in kitchen equipment, and demonstration and preparation table. The theatre is illuminated by concealed lighting, and the colour scheme is beige and cream, with tubular furniture in cream and crimson. Demonstrations have already been given to visiting parties comprising the staffs from Electricity Boards, Women's Guilds, Women's Institutes, and other interested bodies.

The demonstration kitchen of the Revo Electric Co., Ltd.

Nursing Exhibition

Modern maternity will be the theme of the Electrical Development Association stands (S1 and S2) at the Nursing Exhibition being held at Seymour Hall, London, from 11th to 15th October, which will display some examples of the wide range of electrical equipment available to ease the job of the nurse and midwife and make life easier for the patient. The equipment will be divided into three main classes: Appliances suitable for use where the mother has her baby at home; for use in the maternity ward; and for nurses' homes or the midwife's house.

Power System Communications

An advanced course on "Power System Communications" will be given at the Heriot-Watt College, Edinburgh, on seven successive Saturday mornings commencing on 23rd October. The fee will be £2 2s and particulars can be obtained from the secretary of the College, Chambers Street, Edinburgh, 1.

School for Atomic Engineers

Three-month training courses are being arranged at Harwell by the Atomic Energy Authority for people from industrial establishments who will be instructed in the techniques of converting heat from nuclear fission to useful power. The first course was opened on Monday last with an address by Sir John Cockcroft, director, A.E.R.E.

Applicants for the courses of which there will be three a year, are required to be physics or engineering graduates or to have had considerable experience

in science or engineering. A fee of £250 will be charged; this will not cover hotel accommodation. Applications for places in the courses should be sent to the Manager, Reactor School, Atomic Energy Research Establishment, Harwell, Berks.

Electricity in Horticulture

The effectiveness of electricity in horticulture was demonstrated on the stand of the South East Scotland Electricity Board at the Autumn Show of the Royal Caledonian Horticultural Society held in Edinburgh from 15th to 17th September. The display, which showed a 25ft by 14ft glasshouse and a grass plot with an attractive flower bed, demonstrated soil warming and propagating. Forced draught fans, plant irradiators, hot water circulators, soil and root sterilizers were also on view. Of particular interest was a soil shredder, the demonstrations of which attracted much attention. In addition, lawnmowers, hedge and edge trimmers were displayed.

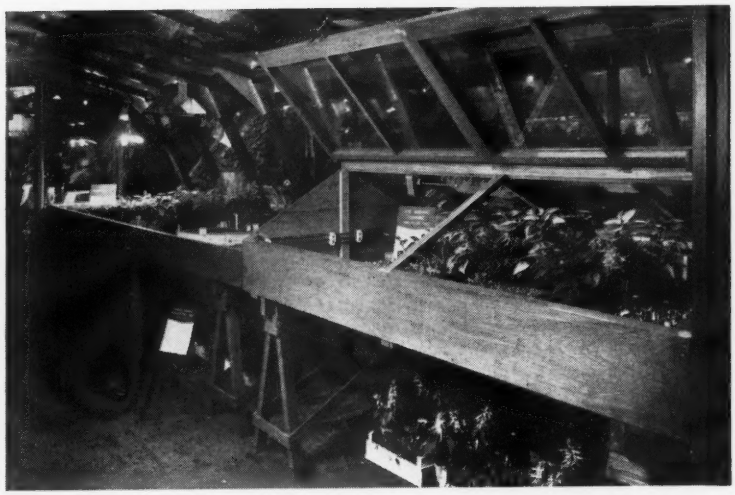
Jackson " Giant " Cooker

The Jackson Electric Stove Co., Ltd., announces that the Jackson " Giant " cooker (catalogue No. 69) is being reintroduced. The specification of the cooker is as before. It has a total loading of 2,600 W, and an oven thermostat and " Simmerstat " to the radiant plate are fitted as standard. The price of the cooker only is £18 2s 6d, and complete with stand and saucepan shelf, £19 19s. Delivery will commence in mid-November.

P.O.A. Conference

The conference of the Purchasing Officers' Association opened yesterday (Thursday) and continues until Sunday at the Royal Hall, Harrogate. Yesterday there was a civic reception and dance, and to-day the business proceedings were to open with an address by Sir Harry Pilkington, president of the F.B.I. Papers being read are: " The Synthetic Age—A Challenge to our Traditional Industries," by Dr. H. K. Whalley; " Purchasing Research," by Mr. F. O. Ashmore; and " Atomic Energy in Industry," by Mr. M. W. Perrin. There will also be a discussion between Professor A. J. Brown, Mr. L. H. Tarring, Mr. S. N. Whitehead and Mr. J. F. Blitz on " Commodity Price Stabilization." In addition to the plenary sessions, sectional meetings are being held.

In conjunction with the conference, the Association is holding its annual " Minibition " at which nearly 100 concerns are exhibiting, among whom are the following:—Edgar Allen & Co., Ltd.; Bakelite, Ltd.; Black & Decker, Ltd.; British Insulated Callender's Cables, Ltd.; British Oxygen Co., Ltd.; British Thomson-Houston Co., Ltd.; Crystalate, Ltd.; Darlington Insulation Co., Ltd.; Drayton Regulator & Instrument Co., Ltd.; General Electric Co., Ltd.; Gent & Co., Ltd.; W. T. Glover & Co., Ltd.; G. A. Harvey & Co. (London), Ltd.; Hopkinsons, Ltd.; Johnson & Phillips, Ltd.; Kent Bros. Electric Wire Co. & E. H. Phillips, Ltd.; London Electric Wire Co. & Smiths, Ltd.; Morgan Crucible Co., Ltd.; Porter Electrical Products, Ltd.; Standard Telephones & Cables, Ltd.; Stanton Ironworks Co., Ltd.; and Yorkshire Copper Works, Ltd.



The display of the S.E. Scotland Electricity Board at the Autumn Show of the Royal Caledonian Horticultural Society

Factory Equipment Exhibition

The 1955 National Factory Equipment Exhibition which is to be held at Earls Court from 28th March to 2nd April, will be nearly seven times the size of the first exhibition held in 1953. The Institution of Works Managers is holding its national conference at Earls Court in connection with the exhibition, and the National Industrial Fuel Efficiency Service will also organize a conference. Exhibits will range from systems of prefabricating complete factories to power, heating, lighting, and ventilating plant. Conveyors, fork lift trucks and other material handling equipment will be on show. In addition, stands have been booked for the display of engineering products, processing plant, tools, packaging equipment and scientific instruments, together with welfare and safety equipment. The exhibition is sponsored by the proprietors of the *Factory Manager* and the *Factory Equipment News*.

Commercial Travellers' Schools

In an appeal for subscriptions to the Royal Commercial Travellers' Schools at Pinner, Mr. B. N. Reckitt, the president, says that at present there are in the Schools 253 children who are being maintained, clothed and educated and each one costs £256 per annum. In addition there is a rebuilding programme which has meant over the last three years an expenditure of some £100,000 to cover which investments have had to be realized and consequently the income from them sacrificed. It is expected that the main building programme will ultimately cost £125,000, but a scheme for a new science block to replace the old building and equipment at present in use may have to be deferred for lack of funds. Every year at least £50,000 is needed from this appeal alone.

Hoover in New Zealand

An associated company of Hoover, Ltd., has been established in New Zealand, with the title of Hoover Sales and Service, Ltd., at 105/107, Anzac Avenue, Auckland. The newly appointed managing director is Mr. F. W. Cave, who has represented Hoover, Ltd., in New Zealand for many years.

Rural Preservation

The National Conference of the Council for the Preservation of Rural England will be held at Shanklin, I. of W., from 7th to 9th October.

Trade Announcements

Ekram Electric, Ltd., has removed to Prince Rupert House, 64, Queen Street, London, E.C.4 (telephone: City 3182).

The Progress Cables & Accessories Co., Ltd., has opened a branch at 12, St. George's Square, Huddersfield (telephone: Huddersfield 6469).

The Telegraph Construction & Maintenance Co., Ltd., has opened a new branch office and depot at 2, Nicholas Buildings, Newcastle-on-Tyne, 1, under the management of Mr. R. Fenwick. A London sales office has also been opened at Norfolk House, St. James's Square, S.W.1, under the management of Mr. A. W. Matkin.

As from next Tuesday, the London office and export division of **Dorman & Smith, Ltd.,** and associate companies, D.S. Plugs, Ltd., and British Klockner Switchgear, Ltd., will be at 125, High Holborn, W.C.1 (telephone: Chancery 6431/3). New stock and store rooms will open on the same date at 21, Little Russell Street, W.C.1.

Domestic Electrical Equipment

Low Temperature Heaters

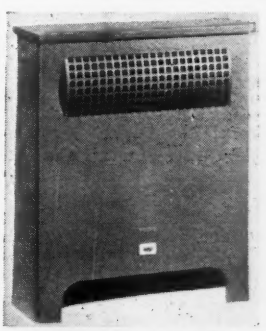
THE reduction in purchase tax announced earlier in the year has no doubt had an effect on the sales of convector heaters and radiators and this is reflected in the number of new designs and styles that have come on to the market during the last few months. Skilful design, taking full advantage of modern plastic moulding techniques, has resulted in an exceptionally attractive appearance for convectors now being constructed in plastic materials and, in addition, those provided with wooden cabinets are available in oak, mahogany, maple, etc., to match any existing furnishing scheme.

Log and coal effects are usually associated with the electric fire, but this season one manufacturer has incorporated them into a range of convector heaters, the whole having the appearance of a portable fireplace, as indeed it is.

From the point of view of safety, particularly where young children are concerned, the use of low temperature heaters is eminently suitable. At all times the element is completely enclosed and the low surface temperature of the outside casing prevents the possibility of burns. Prices remain at about the same level as last season (allowing for the purchase tax changes) but it is possible that the removal of hire-purchase restrictions may tend to allow prospective customers to purchase the more expensive models.

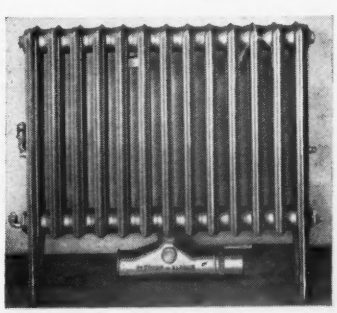
Manufacturer:	The Arora Co.			Belling & Co., Ltd.				
Name or model	441	442	443	"Champion" 91A	"Champion" 92A	"Champion" 83A	85	86
Type	Portable	Floor fixing	Floor fixing	Portable	Portable	Portable	Wall fixing	Wall fixing
Size (height, width & depth in inches)	22×18×6	30×22×6	30×22×6	23¼×9¾ diam	23½×10¼ diam	25×13 diam	22×6×5	22×12×5
Elements	1 kW	2 kW	3 kW	750 W	1·5 kW	2·25 kW	750 W	1·5 kW
Method of control	—	Step	Step	2-heat	2-heat	3-heat	2-heat	2-heat
Casing	Steel	Steel	Steel	Metal	Metal	Metal	Metal	Metal
Finish	Bronze or silver green stove enamel	Bronze stove enamel	Bronze stove enamel	Ripple bronze	Ripple bronze	Ripple bronze	Ripple bronze	Ripple bronze
Price (excl. tax)	£6 10 0	£10 7 6	£10 17 6	£3 11 0	£4 2 6	£4 18 0	£4 2 6	£6 14 0
Purchase tax	£2 7 8	£3 16 1	£3 19 9	£1 6 1	£1 10 3	£1 16 0	£1 10 3	£2 9 2

Manufacturer:	Belling & Co., Ltd. *(continued)*				
Name or model	87	751	752	752A	"Radiant/Convector" 750
Type	Corner wall fixing	Portable	Portable	Portable	Portable
Size (height, width & depth in inches)	22×9×6	24×20¼×8	24×36×8	36×24×8	20¼×26×9¾
Elements	750 W	1 kW	2 kW	3 kW	Convection 1½ kW Radiation 1 kW
Method of control	2-heat	1-heat	3-heat	3-heat	Convection 3-heat Radiation 1-heat
Casing	Metal	Metal	Metal	Metal	Metal
Finish	Ripple bronze	Ripple bronze	Ripple bronze	Ripple bronze	Ripple bronze or cream
Price (excl. tax)	£4 8 0	£7 6 0	£11 17 6	£12 12 6	£12 15 0
Purchase tax	£1 12 4	£2 13 7	£4 7 0	£4 12 7	£4 13 6

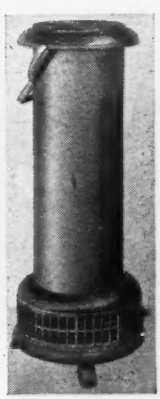


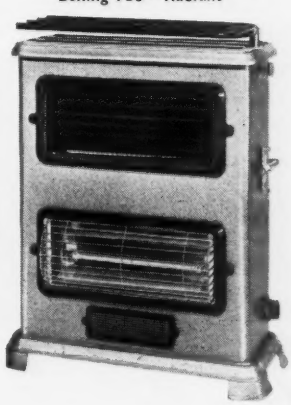
"Arora" air heater and (below) Belling 750 "Radiant"

Manufacturer:	Benham & Sons, Ltd.
Name or model	"Electro-Vapour"
Type	Semi-portable
Size (height, width & depth in inches)	From 22×21×5½ to 28×33×8½
Elements	1 kW to 3 kW immersion
Method of control	Single or 3-heat switch, d.c. or a.c. and thermostat
Casing	Cast iron
Finish	Sprayed aluminium or bronze paint
Price (excl. tax)	£16 18 0 to £27 2 6
Purchase tax	£6 3 4 to £9 18 0



Benham "Electro-Vapour" radiator





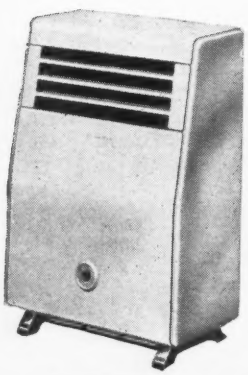
Right: Belling "Champion" 92A heater

LOW TEMPERATURE HEATERS . . . . . *continued*

Manufacturer:	Berry's Electric, Ltd.						Bescol (Electric), Ltd.	
Name or model	"Raydair" 880/1	"Raydair" 880/1½	"Raydair" 880/1½	"Raydair" 890/1	"Raydair" 890/1½	"Raydair" 890/2	"Portable"	"Portable"
Type	Portable or wall mounting	Portable or wall mounting	Portable or wall mounting	Portable or wall mounting	Portable or wall mounting	Portable or wall mounting	Portable	Portable
Size (height, width & depth in inches)	20×26×7⅜	20×26×7⅜	20×34×7⅜	22×22½×7¼	20×30½×7¼	20×45×7¼	15¾×11¼×4¾	28×18¾×6½
Elements	Low temperature radiation 1 kW	Low temperature radiation 1½ kW	Low temperature radiation 1½ kW	Low temperature radiation 1 kW	Low temperature radiation 1½ kW	Low temperature radiation 2 kW	1 kW asbestos mat	2 kW asbestos mat
Method of control	Pre-set thermostat	Pre-set thermostat	Pre-set thermostat	Infinitely variable	Infinitely variable	Infinitely variable	None	Switch or thermostat
Casing	Steel	Steel	Steel	Steel	Steel	Steel	Steel	Steel
Finish	Peach bronze or penny bronze	Peach bronze or penny bronze	Peach bronze or penny bronze	Peach bronze or penny bronze	Peach bronze or penny bronze	Peach bronze or penny bronze	Various	Various
Price (excl. tax)	£9 15 0	£9 15 0	£12 12 0	£10 12 6	£13 15 6	£21 5 0	£3 15 0	Sw.: £6 8 0 Stat.: £8 3 0
Purchase tax	£3 11 4	£3 11 4	£4 12 1	£3 17 8	£5 0 9	£7 15 5	£1 7 6	Sw.: £2 6 10 Stat.: £2 19 8

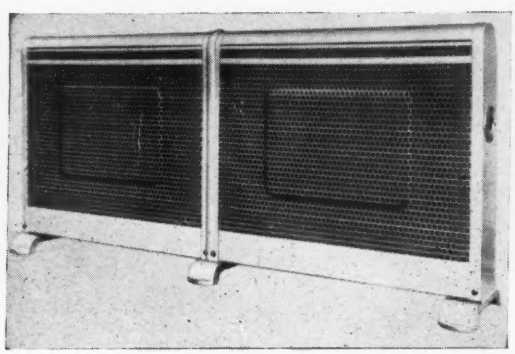
Bescol "De Luxe" heater and (left) Bratt Colbran "209" convector

Manufacturer:	Bescol (Electric), Ltd. *(continued)*		Bratt Colbran, Ltd.	British National Electrics, Ltd. ("B.N.E.")
Name or model	"De Luxe"	"Hot-Tot"	209	P.20T
Type	Portable	Portable	Portable	Portable
Size (height, width & depth in inches)	25×20×7	17" high × 11½" diam	29¼×14×7½	24½×19½×8½
Elements	2 kW asbestos mat	1 kW asbestos mat	1½ kW	2 kW
Method of control	Switch or thermostat	None	Half-heat	Thermostatic
Casing	Steel	Steel	Pressed steel	Steel
Finish	Various	Various	Beige	Black crackle with flame gold louvres
Price (excl. tax)	Sw.: £8 14 0 Stat.: £10 9 0	£2 5 0	£9 15 0	£11 0 0
Purchase tax	Sw.: £3 3 10 Stat.: £3 16 8	£0 16 6	£3 11 3	£4 0 6

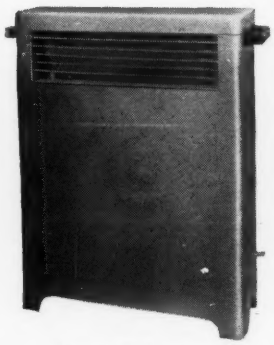


"Thermovent" FRC1 heater and (left) SRC1 heater

Manufacturer:	E. K. Cole, Ltd. ("Thermovent")			
Name or model	FR1 & FRC1	FR2 & FRC2	SR1 & SRC1	SR2 & SRC2
Type	Portable	Portable	Portable	Portable
Size (height, width & depth in inches)	23×16½×9½	23×25½×9½	23×15½×8¾	23×24½×8¾
Elements	1 kW	2 kW (2-heat switch)	1 kW	2 kW (2-heat switch)
Method of control	FR1: Step FRC1: Variable thermostatic	FR2: Step FRC2: Variable thermostatic	SR1: Step SRC1: Variable thermostatic	SR2: Step SRC2: Variable thermostatic
Casing	Plastic	Plastic	Steel	Steel
Finish	Polished walnut	Polished walnut	Bronze stoved enamel	Bronze stoved enamel
Price (excl. tax)	FR1: £7 0 0 FRC1: £8 5 0	FR2: £10 10 0 FRC2: £11 10 0	SR1: £6 10 0 SRC1: £7 10 0	SR2: £9 10 0 SRC2: £10 10 0
Purchase tax	FR1: £2 11 3 FRC1: £3 0 4	FR2: £3 16 10 FRC2: £4 4 2	SR1: £2 7 7 SRC1: £2 14 11	SR2: £3 9 6 SRC2: £3 16 10



Belling 751 convector and (right) Berry's "Raydair" 880/2

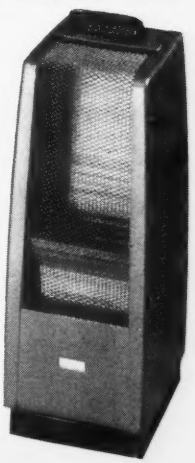


Dexray C.20 convector

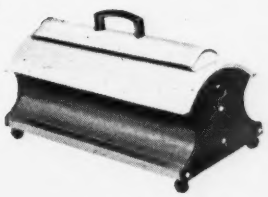
Manufacturer:	E. K. Cole, Ltd. ("Thermovent") (*continued*)			Dexray Engineering Co., Ltd.		Dimplex, Ltd.		
Name or model	SR3 & SRC3	B2 & BC2	B1 & BC1	C.20	C.21	A.38	B.48 & B.310	C.412
Type	Portable	Inset wall mounting	Inset wall mounting	Portable	Portable	Panel oil-filled	Panel oil-filled	Panel oil-filled
Size (height, width & depth in inches)	23×24½×8¾	22½×23⅜×1⅜	22¼×14½×1⅜	25×18×6	Circular 9" diam 26" high	20½×26×6½	26½×26×6½ (B.48) 20½×31½×6½ (B.310)	26½×36¾×6½
Elements	3 kW	2 kW	1 kW	Ceramic insulated 2 kW	Ceramic insulated 1½ kW	500 W	750 W	1 kW
Method of control	SR3: Step SRC3: Variable thermostatic	B2: Step BC2: Variable thermostatic	B1: Step BC1: Variable thermostatic	Step	Step	Thermostat and pilot light	Thermostat and pilot light	Thermostat and pilot light
Casing	Steel	Plastic panels with steel grille	Plastic panels with steel grille	Steel	Steel	Pressed steel	Pressed steel	Pressed steel
Finish	Bronze stoved enamel	—	—	Hammer bronze or cream	Hammer bronze	Light bronze	Light bronze	Light bronze
Price (excl. tax)	SR3: £10 10 0 SRC3: £11 10 0	B2: £10 15 0 BC2: £12 0 0	B1: £7 10 0 BC1: £8 15 0	£7 13 4	£4 13 4	£9 10 0	£11 10 0	£13 10 0
Purchase tax	SR3: £3 16 10 SRC3: £4 4 2	B2: £3 18 8 BC2: £4 7 9	B1: £2 14 11 BC1: £3 4 0	£2 17 6	£1 15 0	£3 9 6	£4 4 0	£4 18 9

Manufacturer:	Dimplex, Ltd. (*continued*)					Dorset Light Industries, Ltd.		Falk, Stadelmann
Name or model	ER.316	D.416 & D.320	E.420	150	200	"Vectorad" De Luxe	"Vectorad" Standard	95710 "Peerless"
Type	Panel oil-filled	Panel oil-filled	Panel oil-filled	Column oil-filled	Column oil-filled	Portable	Portable	Portable
Size (height, width & depth in inches)	20½×47½×6½	26½×47½×6½ (D.416) 20½×57¾×6½ (D.320)	26½×57¾×6½	21×30×5½	21×39½×5½	10½×20×9¾	10½×20×9¾	25½×16×10½
Elements	1½ kW	1½ kW	2 kW	1½ kW	2 kW	2 400 W pencil bar	Pencil bar 800 W	Black-heat spirals—1 kW wound on formers
Method of control	Thermostat and pilot light	Thermostat and pilot light	Thermostat and pilot light	Thermostat and pilot light	Thermostat and pilot light	—	—	Step—1 or 2 kW
Casing	Pressed steel	Pressed steel	Pressed steel	Pressed steel	Pressed steel	"Birmabright"	"Birmabright"	Steel
Finish	Light bronze	Light bronze	Light bronze	Light bronze	Light bronze	Stove-enamelled	Polished "Birmabright"	Enamelled hammered pewter
Price (excl. tax)	£15 10 0	£17 10 0	£21 10 0	£19 10 0	£24 10 0	£5 12 9	£4 11 7	£10 10 0
Purchase tax	£5 13 3	£6 8 0	£7 17 3	£7 2 6	£8 19 3	£2 2 3	£1 14 5	£3 17 0

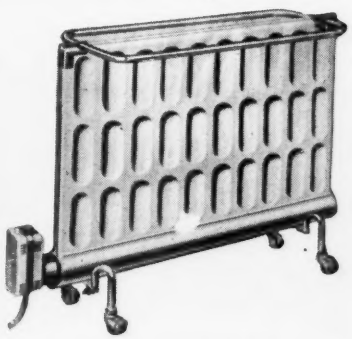
Manufacturer:	H. Frost & Co., Ltd.	G.B.M. (Electrical), Birmingham, Ltd.	
Name or model	"Sunhouse" No. 5075	P.1	P.5
Type	Portable	Portable or wall	Portable or wall
Size (height, width & depth in inches)	22½×8×8	27½×21½×2	33½×61¾×2
Elements	750W open spiral nickel-chrome	500 W withdrawable	2 kW withdrawable
Method of control	—	All variable controls	
Casing	Steel	Pressed steel	Pressed steel
Finish	Hammered brown stoved enamel	Standard gold or other colours to order	
Price (excl. tax)	£3 18 9	£9 5 0	£21 10 0
Purchase tax	£1 8 11	£3 7 8	£7 17 3

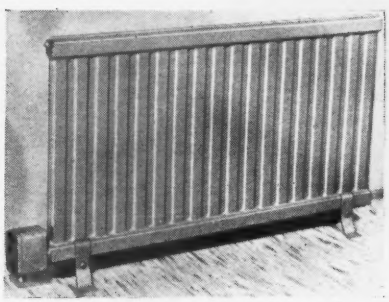


Right: Frost "Sunhouse" convector

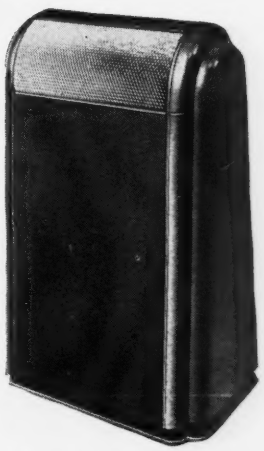


D.L.I. "Vectorad" radiator





Dimplex ¾ kW model "B.130" fitted with towel rail and (right) G.B.M. oil-filled radiator



Falk's 95710 "Peerless" convector

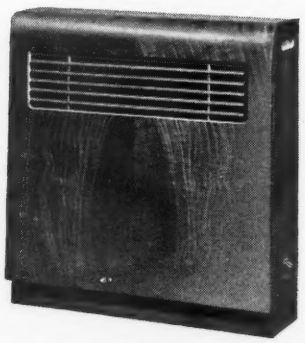
LOW TEMPERATURE HEATERS . . . . . *continued*

Manufacturer:	G.B.M. *(continued)*		G.E.C.	Gillott Electro Appliances, Ltd.			Grubb Engineering Co., Ltd.	
Name or model	C.1	C.4	D2800A	"Cotswold"	"Chalford"	"Gloucester"	Convector	Radiator
Type	Portable	Portable	Portable	Fan heater, wall mounting	Portable	Portable	Portable	Oil filled dome
Size (height, width & depth in inches)	18×21×5	24×44×5	27×16½×7½	—	24×7 diam	24×7 diam	25×18×3	23×32 to 28½×72
Elements	500 W	2·0 kW	One 1,500 W rod	1½ kW black heat	1 kW black heat	1½ kW black heat	Two 1 kW horizontal spirals	½ kW to 2 kW
Method of control	All variable controls		Step	Switched, hot or cold	1-heat	2-heat	2-heat switch	Thermostat
Casing	Pressed steel	Pressed steel	Sheet metal	Pressed steel	Pressed steel	Pressed steel	Steel	Steel
Finish	Standard gold or other colours to order		Bronze	Deep maroon hammered bronze	Bronze	Bronze	Hammered gilt	Metallic paint
Price (excl. tax)	£9 17 6	£23 10 0	£8 5 0	£5 15 0	£3 0 0	£3 15 0	Castor: £6 10 0 Standard: £6 5 0	£9 12 6 to £21 19 6
Purchase tax	£3 13 2	£8 11 10	£3 0 4	£2 2 0	£1 1 11	£1 7 5	Castor: £2 7 6 Standard: £2 5 8	£3 10 4 to £8 0 8

Manufacturer:	Grubb Eng. *(continued)*	Heatovent Electric, Ltd.		Heatrae, Ltd.				
Name or model	"Radiator"	"Console"	"Console"	321	323	2410	2430	W.46
Type	Oil filled castor	Portable	Portable	Floor	Floor	Wall	Wall	Portable
Size (height, width & depth in inches)	23×32 to 28½×72	23×21⅞×6½	23×21⅞×6½	34½×18½×6½	34½×29×6½	30½×14×5	30½×38×5	34×21×7
Elements	½ kW to 2 kW	2 kW	2 kW	1 kW enclosed	3 kW enclosed	1 kW enclosed	3 kW enclosed	Mica wound clamped, 2 kW
Method of control	Thermostat	Thermostatic	Thermostatic	Step	Step	Step	Step	Step
Casing	Steel	Wood veneer	Wood veneer	Steel	Steel	Steel	Steel	Steel
Finish	Metallic paint	Oak, mahogany and walnut	Maple	Stove enamel	Stove enamel	Stove enamel	Stove enamel	Stove enamel
Price (excl. tax)	£10 0 0 to £22 7 0	£13 0 0	£15 0 0	£8 18 6	£17 13 6	£8 8 0	£16 14 0	£18 7 6
Purchase tax	£3 13 1 to £8 3 5	£4 15 0	£5 9 8	£3 5 4	£6 9 3	£3 1 5	£6 2 2	£6 14 5

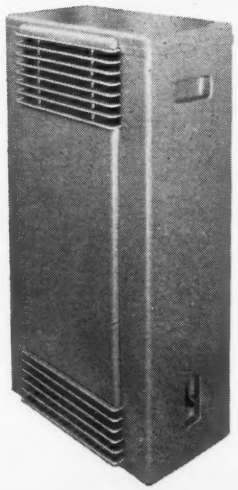
Manufacturer:	Heatrae, Ltd. *(continued)*	Hobourn Domestic Appliances, Ltd.		
Name or model	W.26	"Hobourn"	"Hobourn"	"Ocean"
Type	Wall mounting	Portable	Wall mounting	Portable oil filled
Size (height, width & depth in inches)	20×21½×3¾	17×22½×6½	18×19⅜×4⅝	Size 1: 24¾×19¾×8 Size 2: 26×26×8 Size 3: 28×31¾×8
Elements	Mica wound clamped, 2 kW	Patent Hobourn safety element, Two–600 W	Patent Hobourn safety element, Two–500 W	(1) 720 W (2) 1,200 W (3) 1½ kW Immersion type
Method of control	Step	On/Off	On/Off	On/Off
Casing	Steel	Steel	Steel	Steel
Finish	Stove enamel	Stove (cream) enamelled	Stove (ivory or gold) enamelled	Stove (cream) enamelled
Price (excl. tax)	£15 17 6	£7 9 0	£7 0 0	(1) £21 13 6 (2) £23 12 11 (3) £28 3 6
Purchase tax	£5 16 1	£2 14 9	£2 11 6	(1) £5 16 6 (2) £6 7 1 (3) £7 11 5

Manufacturer:	C. Hounslow & Co. ("Chalex")			
Name or model	No. 2 Standard	No. 7 Panel inset	No. 13 Panel offset	No. 12 Dual purpose
Type	Portable	Wall mounting	Wall mounting	Wall mounting
Size (height, width & depth in inches)	27×16×9½	19½×20½×1⅛	19½×20½×4½	23½×17×5¾
Elements	2 kW black heat	2 kW black heat	2 kW black heat	1 kW black heat & 1 kW radiant
Method of control	Switch to operate 1 kW or 2 kW	Thermostatic	Thermostatic	Two switches
Casing	Steel	Steel	Steel	Steel
Finish	Hammered beige	Figured walnut	Figured walnut	Bronze
Price (excl. tax)	£8 2 6	£10 16 9	£10 16 9	£7 17 6
Purchase tax	£2 19 9	£3 19 8	£3 19 8	£2 17 11

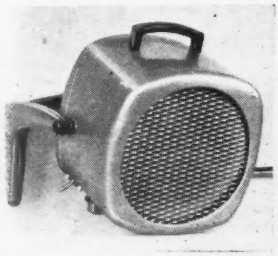


Left: Heatovent "Console" convector heater

Gillott "Chalford" convector

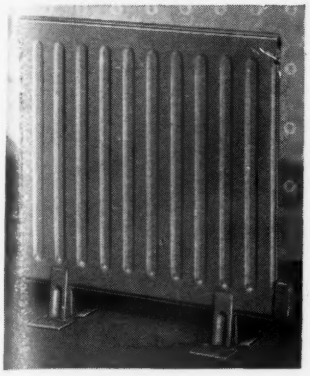


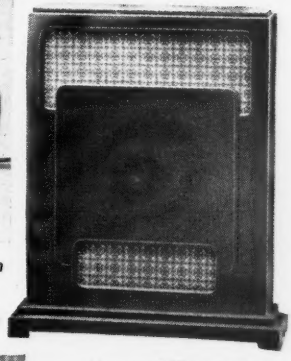
Left: Hounslow streamlined "Chalex" convector



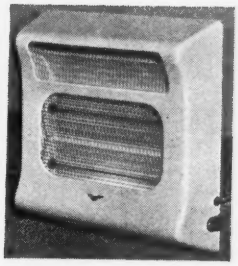
Above: Gillott "Cotswold" fan heater

Below: Hurseal thermostatically controlled portable panel heater



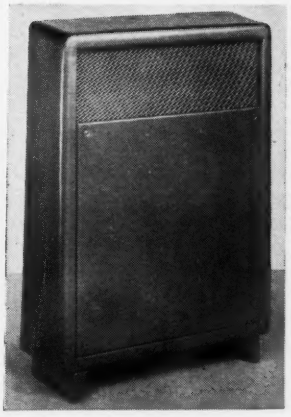


Heatrae 323 convector

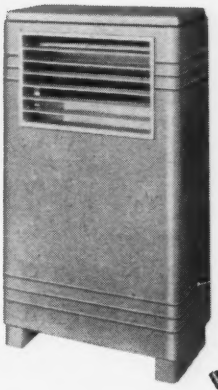


Left: "Hobourn" wall model

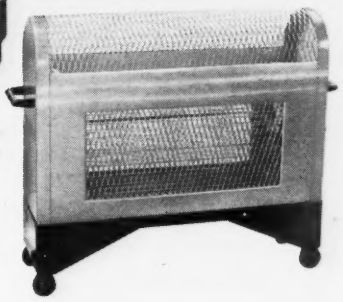
Right: Hume, Atkins' E.5834/5835 convector



Below: G.E.C. "D2800A" convector heater



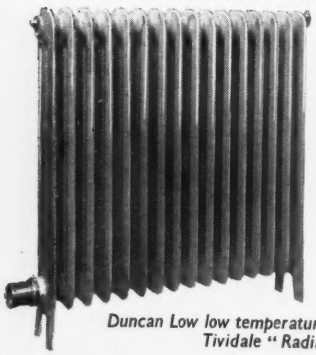
Right: Portable "Hobourn" convector heater



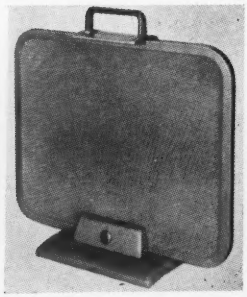
Manufacturer:	C. Hounslow & Co. ("Chalex") *(continued)*						Hurseal, Ltd.	
Name or model	No. 5 &-6 Wall	No. 18 & 19 Pixie	No. 21 Superb	No. 3 De Luxe	No. 24 Dual purpose	No. 4 Triangle	F11–20 & T.V.3	T.V.$\frac{1}{2}$–1
Type	Wall fixing	Offset wall fixing	Portable	Portable	Portable	Portable	Floor oil-filled	Portable panel oil-filled
Size (height, width & depth in inches)	$23\frac{1}{2}\times17\times5\frac{3}{4}$	$14\frac{1}{2}\times12\times4\frac{1}{2}$	$30\times16\times9\frac{1}{4}$	$27\frac{1}{2}\times16\frac{1}{2}\times9$	$27\times16\times9\frac{1}{2}$	$32\times21\times10\frac{3}{4}$	$21\times14\frac{1}{2}\times5\frac{1}{2}$ to $28\times36\frac{3}{4}\times5\frac{1}{2}$	$27\times29\frac{1}{2}\times\frac{3}{4}$ and $27\times54\frac{1}{2}\times\frac{3}{4}$
Elements	1 & 2 kW	750 W & 1 kW	2 kW	2 kW	1 kW black heat 1 kW radiant	2 kW	$\frac{1}{2}$–2 kW "Torribar" Sheathed wire	$\frac{1}{2}$–1 kW "Torribar" Sheathed wire
Method of control	Switch	Switch	Thermostatic with switch	Thermostatic with switch	2-switch control	Switch 1 kW or 2 kW	Hand control or built-in thermostat extra	Built-in thermostat
Casing	Steel	Steel	Steel	Steel	Steel	Steel	Pressed steel	Pressed steel
Finish	Bronze	Hammered beige	Hammered antique gold	Hammered beige and black	Hammered beige	Bronze and black	Cream or bronze stove enamel	Cream or bronze stove enamel
Price (excl. tax)	1 kW: £5 5 0 2 kW: £6 11 6	£5 5 0	£9 9 0	£10 9 6	£10 0 0	£8 17 6	£10 15 6 to £23 19 6	£8 16 6 & £13 17 6
Purchase tax	1 kW: £1 18 7 2 kW: £2 8 4	£1 18 7	£3 9 6	£3 17 0	£3 13 6	£3 5 3	£4 4 0 to £9 7 0	£3 4 2 & £5 1 6

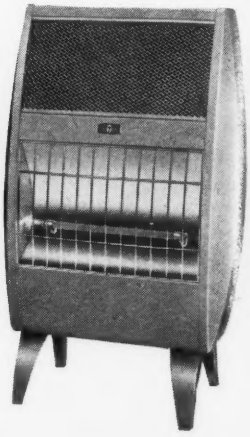
Manufacturer:	Hurseal, Ltd. *(continued)*		Hume, Atkins & Co., Ltd.				M. & J. Lossos & Co., Ltd.	Duncan Low, Ltd.
Name or model	B.C.D.F.G.	P.1–9	E.5834	E.5835	E.5836	E.5837	"Kaloric"	"Dunlow"
Type	Panel or wall fixing oil-filled	Panel or wall fixing oil-filled	Portable—can be easily modified for wall fixing				Cabinet	Hot water radiators
Size (height, width & depth in inches)	$24\times29\times1\frac{3}{8}$ to $24\times81\times1\frac{3}{8}$	$18\times38\frac{1}{2}\times\frac{3}{4}$ to $30\times70\times\frac{3}{4}$	$26\times18\times6\frac{1}{2}$	$27\frac{1}{2}\times19\frac{1}{2}\times7$	$30\times20\times4\frac{1}{2}$ (feet $6\frac{1}{2}$)	$30\times20\times4\frac{1}{2}$ (feet $6\frac{1}{2}$)	$19\frac{3}{4}\times12\frac{1}{2}\times6\frac{1}{4}$ (*a* & *b*) and $25\frac{3}{4}\times22\times7$ (*c* & *d*)	$18\times19\frac{3}{4}\times5\frac{5}{8}$ to $36\times35\frac{1}{4}\times8\frac{5}{8}$
Elements	$\frac{1}{2}$–1$\frac{1}{2}$ kW "Torribar" Sheathed wire	$\frac{1}{2}$–2 kW "Torribar" Sheathed wire	Nichrome 2 kW	Nichrome 3 kW	Nichrome 2 kW	Nichrome 3 kW	750 W (*a*), 1 kW (*b*), 2 kW (*c*) and 3 kW (*d*) black heat	$\frac{1}{2}$ kW to 3 kW
Method of control	Hand control	Built-in thermostat	Step (switch) or variable by thermostat				Switch or thermostat	Thermostatic
Casing	Pressed steel	Pressed steel	Steel	Steel	Steel	Steel	Steel	Pressed steel
Finish	Priming coat only	Cream or bronze stove enamel	Spray painted crackle or hammered finish in standard colours				Bronze	Grey primer
Price (excl. tax)	£7 19 6 to £15 19 6	£8 19 6 to £21 19 6	£9 6 8	£10 15 0	£11 6 8	£12 10 0	£6 6 0 (*a*), £6 6 0 (*b*), £10 0 0 (*c*), £11 11 0 (*d*)	£8 10 0 to £25 0 0
Purchase tax	£3 2 3 to £6 4 7	£3 10 0 to £8 11 5	£3 10 0	£4 0 8	£4 5 0	£4 13 9	£2 6 1 (*a*), £2 6 1 (*b*), £3 13 2 (*c*), £4 4 6 (*d*)	£3 6 8 to £9 15 0

LOW TEMPERATURE HEATERS . . . . . *continued*

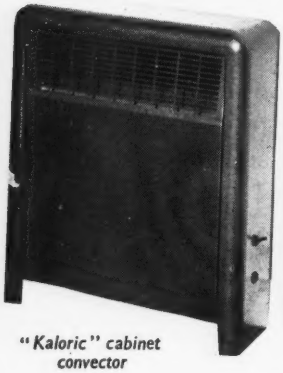


Duncan Low low temperature hot water radiator and (right) Tividale "Radian" space heater

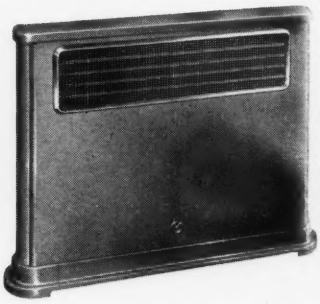




Morphy-Richards RP/10 heater and (right) "Medway" convector



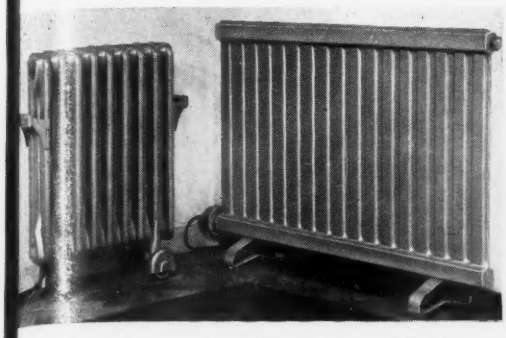
"Kaloric" cabinet convector

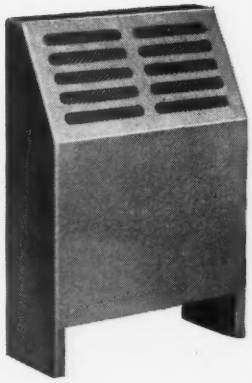


Left: Reinforced Plastics "Melton" fuel effect convector. Above: "Rem" portable oil-filled radiator. Right: "Memvair" 2 kW convector

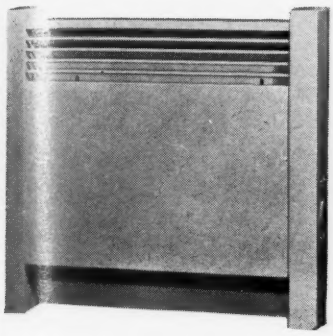
Manufacturer:	Midland Electric Manufacturing Co., Ltd.			Morphy-Richards, Ltd.				
Name or model	"Memvair"	"Memvair"	"Memvair"	RP/75	RP/10	QU/10	QS/20 & QT/20	"Medway"
Type	Portable	Portable	Portable	Panel heater	Panel heater	Portable	Portable	Portable
Size (height, width & depth in inches)	24×22×6½	24×22×6½	24×32×6½	17½×14×6	17½×18×6	27×17×9	27×21×9	27×17×9
Elements	1 kW coiled spiral	1½ kW coiled spiral	Two 1 kW coiled spiral	750 W	1 kW	1 kW	2 kW	1 kW black heat 1 kW radiant
Method of control	Thermostat if required	Step or thermostat	Step or thermostat	—	—	—	Switch QS/20 Thermostat QT/20	Switch
Casing	Steel	Steel	Steel	Steel	Steel	Steel	Steel	Steel
Finish	Bronze	Bronze	Bronze	Warm bronze	Warm bronze	Warm bronze	Warm bronze	Warm bronze
Price (excl. tax)	£7 12 0 (with thermostat £9 7 0)	£8 10 0 (with thermostat £9 15 0)	£11 0 0 (with thermostat £12 10 0)	£3 7 6	£3 15 0	£5 5 0	QS/20: £6 10 0 QT/20: £7 5 0	£7 0 0
Purchase tax	£2 15 7 (with thermostat £3 8 4)	£3 2 2 (with thermostat £3 11 4)	£4 0 5 (with thermostat £4 11 5)	£1 4 9	£1 7 5	£1 18 5	QS/20: £2 7 6 QT/20: £2 13 0	£2 11 2

Manufacturer:	Reinforced Plastics, Ltd.	Remploy, Ltd.	Santon, Ltd.					Steel Radiators, Ltd.
Name or model	"Melton"	"Rem"	Fluid filled radiators					"Stelrad" 500 E.C., 500 W.24 and 500 C.18
			Column		Panel			
Type	Fuel effect convector	Portable oil-filled	Portable	Portable	Portable	Portable	Wall	Portable oil-filled
Size (height, width & depth in inches)	25×33×8½	26×27½×8¼	24⅝×18×6	24⅝×28×6	24⅝×36×6	24×41×8	24×41×8	24×16½×3 (1) 25½×25½×1⅞(2) 18×16½×5 (3)
Elements	Two 1 kW	500 W & 750 W	1 kW	1½ kW	2 kW	1 kW	1 kW	½ kW
Method of control	Switch	Thermostat	Thermostat	Thermostat	Thermostat	Thermostat	Thermostat	Variable thermostat
Casing	Sheet steel	Steel (DDQ)	Steel	Steel	Steel	Steel	Steel	Steel
Finish	Antique silver or bronze	Hammered beige	Stone	Stone	Stone	Stone	Stone	Hammered beige or cream
Price (excl. tax)	£7 18 4 to £11 15 0	£8 10 0 (500 W) £9 5 0 (750 W)	£15 15 0	£22 0 0	£26 10 0	£11 11 0	£11 11 0	£10 0 0
Purchase tax	£2 17 1 to £4 4 9	£3 2 2 (500 W) £3 7 8 (750 W)	£5 15 6	£8 1 4	£9 14 4	£4 4 8	£4 4 8	£3 15 0

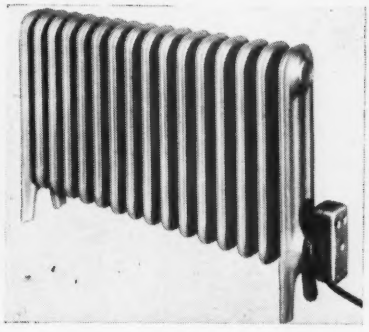




Santon column and panel type radiators and (right) Sutcliffe & Clarkson "HC/1" convector



Unity Heating "Conp" convector



"Stelrad" model 2 oil-filled radiator

Manufacturer:	Steel Radiators, Ltd. (continued)	
Name or model	"Stelrad" 1,000 E.C., 1,000 W.24 and 1,000 C.18	"Stelrad" 1,500 E.C., 1,500 W.24, 1,500 W.30 and 1,500 C.24
Type	Portable oil-filled	Portable oil-filled
Size (height, width & depth in inches)	24×31×3 (1) 25½×45×1⅝ (2) 18×32½×5 (3)	24×45×3 (1) 25½×66×1⅝ (2) 31½×52×1⅝ (3) 24×29×5 (4)
Elements	1 kW	1½ kW
Method of control	Variable thermostat	Variable thermostat
Casing	Steel	Steel
Finish	Hammered beige or cream	Hammered beige or cream
Price (excl. tax)	£12 13 4	£16 5 0
Purchase tax	£4 15 0	£6 1 11

Manufacturer:	Steel Radiators (continued)	Tividale Foundry, Ltd.
Name or model	"Stelrad" 2,000 E.C., 2,000 W.30 and 2,000 C.24	"Radian"
Type	Portable oil-filled	Wall or floor mounting
Size (height, width & depth in inches)	24×57½×3 (1) 31½×68½×1⅝(2) 24×38×5 (3)	12×20×3½ plus mounting
Elements	2 kW	750 W
Method of control	Variable thermostat	Room-thermostat
Casing	Steel	Aluminium alloy
Finish	Hammered beige or cream	Gold, pastel copper or silver
Price (excl. tax)	£19 16 0	£8 15 0
Purchase tax	£7 8 6	£3 1 3

Manufacturer:	Sutcliffe & Clarkson, Ltd.			
Name or model	HC/1	HC/1A	HC/2	HC/2A
Type	Portable	Portable	Portable	Portable
Size (height, width & depth in inches)	22×15×6	22×15×6	25×18×7	25×18×7
Elements	Nickel/Chrome spirals, 750 W	Nickel/Chrome spirals, 1 kW	Nickel/Chrome spirals, 1,200 W	Nickel/Chrome spirals, 1½ kW
Method of control	—	—	Half heat switch	Half heat switch
Casing	Steel	Steel	Steel	Steel
Finish	Hammer bronze stove enamel		Black, with bronze anodized grilles	
Price (excl. tax)	£4 14 0	£4 14 0	£7 2 8	£7 2 8
Purchase tax	£1 15 3	£1 15 3	£2 13 6	£2 13 6

Manufacturer:	Unity Heating, Ltd.			
Name or model	"Cab"	"Conp"	"Snug"	"Wode"
Type	Wall mounting	"Floodwarmth" portable	"Floodwarmth" portable	"Floodwarmth" portable
Size (height, width & depth in inches)	17½×14½×4½ to 21½×20½×6	28×30×5	19½×23½×6½	23×29×6
Elements	½ kW to 3 kW	1 kW to 3 kW	750 W to 1½ kW	1 kW and 2 kW
Method of control	Half heat switch above 1 kW	Two heat above 1 kW	Thermostat	Thermostat
Casing	Steel	Steel	Wood	Wood
Finish	Aluminium, bronze, cream, dark oak, green or grey		Cream-gold, light green-gold & rose pink-gold	Natural oak or mahogany
Price (excl. tax)	£6 10 0 to £10 5 0	£8 0 0 to £9 10 0	£6 10 0 to £7 10 0	£8 10 0 (1 kW) £9 0 0 (2 kW)
Purchase tax	£2 7 6 to £3 14 10	£2 18 5 to £3 9 4	£2 7 5 to £2 14 9	£3 2 1 (1 kW) £3 5 8 (2 kW)

LIST OF MANUFACTURERS

The Arcra Co., Rosebery Street, Loughborough.
Belling & Co., Ltd., Southbury Road, Enfield.
Benham & Sons, Ltd., 66, Wigmore Street, W.1.
Berry's Electric, Ltd., Newman Street, W.1.
Bescol (Electric), Ltd., 118, Parkfield Road, Saltley, Birmingham, 8.
Bratt Colbran, Ltd., 10, Mortimer Street, W.1.
British National Electrics, Ltd., Newarthill, Motherwell, Lanarks.
Cole, E. K., Ltd., Ekco Works, Southend-on-Sea.
Dexray Engineering Co., Ltd., 34, Ardwick Green South, Manchester, 13.
Dimplex, Ltd., Totton, Southampton.
Dorset Light Industries, Ltd., East Street, Bridport, Dorset.
Falk, Stadelmann & Co., Ltd., 91, Farringdon Road, E.C.1.
Frost, H., & Co., Ltd., Fieldgate, Walsall.
G.B.M. (Electrical) Birmingham, Ltd., 439, Moseley Road, Birmingham, 12.
General Electric Co., Ltd., Magnet House, Kingsway, W.C.2.
Gillott Electro Appliances, Ltd., Cotswold Works, Chalford, nr. Stroud.
Grubb Engineering Co., Ltd., Mary Street, Birmingham, 12.
Heatovent Electric, Ltd., Lomond Street, Possilpark, Glasgow, N.
Heatrae, Ltd., Heatrae Works, Norwich.
Hobourn Domestic Appliances, Ltd., Temple Farm Works, Strood, Rochester, Kent.
Hounslow, C., & Co., Ltd., Chalex Works, Southwick, Sussex.
Hume, Atkins & Co., Ltd., New Icknield Way, Letchworth, Herts.
Hurseal, Ltd., 229, Regent Street, W.1.
Lossos, M. & J., & Co., Ltd., 31, Beethoven Street, W.10.
Low, Duncan, Ltd., 299, Bell Street, Glasgow, C.4.
Midland Electric Manfg. Co., Ltd., Tyseley, Birmingham, 11.
Morphy-Richards, Ltd., 6, Conduit Street, W.1.
Reinforced Plastics, Ltd., 11–14, Bath Lane, Leicester.
Remploy, Ltd., Oxgate Lane, Cricklewood.
Santon, Ltd., Somerton Works, Newport, Mon.
Steel Radiators, Ltd., Stelrad Works, Bridge Road, Southall.
Sutcliffe & Clarkson, Ltd., Whittlefield Mill, Burnley, Lancs.
Tividale Foundry, Ltd., Local Board Road, High Street, Watford.
Unity Heating, Ltd., Chilworth Manor, Southampton.

Financial Section

STOCKS and SHARES

THE announcement by Imperial Chemical Industries of an increase in the current year's interim dividend from 3 to 4 per cent was among the factors helping to steady Stock Exchange markets towards the end of a rather uneven month. The shares concerned were marked up to a new record price of over 40s before going back to 40s offered. In the electrical equipment market, a main point of interest was the report of Sir Harry Railing's speech at the G.E.C. meeting, where he expressed no fear about prospects in the home market, but underlined the increasingly competitive character of the export field. British Insulated Callender's Cables shares have moved little since news of the company's agreement to invest in the new electrolytic refinery at the Roan Antelope copper mine, but copper shares staged a boomlet of their own, on the recovery in the price of metal.

Price Changes

Aberdare Cables 5s shares have risen further to 13s 9d since the declaration of the increase in the current year's interim dividend. For similar reasons Watford Electrics moved up to 7s 3d and Sturtevants were firm, the latter being called 44s 3d in the market. Both the last-mentioned companies are maintaining their interim payments at the same rates as before, but on capital increased by scrip issues. Ericssons repeated the previous week's advance of half-a-crown. Others to register gains included Desoutters, Tube Investments, Parnalls and Allen Wests. In the reverse direction, Hoovers lost another 1s 6d of their big earlier rise, but generally losses were insignificant. Telephone Properties are nominally unchanged at 5¼, according to the official price. Dealings started this week in the new issues that emerge from the complicated reorganization plan.

Capitalization Issues

E. K. Cole 5s shares, officially quoted at 32s, have been changing hands around 34s 6d since news of the company's proposal to make a scrip distribution, through the capitalization of reserves, in the proportion of one new share for every share or unit now held. Consent of the Capital Issues Committee has been obtained, and the necessary meeting is to be held on 19th October. Electric Construction £1 shares have changed hands at a little over 63s since that company's announcement of its intention to make a share-for-share issue. Both companies give stockholders a warning to the effect that the doubling of the capital should not be taken necessarily to imply any increase in the amounts to be distributed in dividend.

I.C.I.'s total dividend for 1953 was equivalent to 7½ per cent on the present capital, and at that rate the yield on the shares at 40s is 3¾ per cent. The increase in the interim payment for the current year encourages the market, however, to value the shares tentatively

The Week's Price Changes

Company or Board	Nom. Value	Middle price 27th Sept.	Week's Rise or Fall	Dividend Previous	Dividend Last	Yield %	1954 Highest	1954 Lowest
						£ s d		
Gilt-edged Stocks								
Brit. Elec. 1968/73	100	95½		3	3	3 2 10	97	88⅞
Brit. Elec. 1974/77	100	95		3	3	3 3 2	96½	87½
Brit. Elec. 1976/79	100	101½		3½	3½	3 9 0	101½	93 3/16
Brit. Elec. 1974/79	100	109		4½	4½	3 18 0	111½	103 3/16
Overseas Electric Supply								
Calcutta Elec.	£1	23/6	−6d	6†	6†	5 0 0†	24/6	18/7
East African Power	£1	22/-		7	7	6 7 3	23/4	19/6
Nigerian Elec.	£1	24/-		10	10	8 6 8	25/-	23/6
Palestine Elec. "A"	£1	21/-		Nil	Nil	—	21/-	16/-
Perak Hydro-Elec.	£1	14/9		Nil	6	8 2 8	16/-	13/9
Equipment and Manufacturing								
Aberdare Cables	5/-	13/9	+9d	25	12½†	4 11 0	13/9	8/1
Aerialite	1/-	13/9		88½	88½	6 8 6	14/-	10/9
Allen, W. H.	£1	77/-	+9d	15	20	5 4 0	77/-	50/-
Aron Elec. Ord.	£1	52/6		20	15	5 14 3	53/9	43/-
Assoc. Elec. Ord.	£1	56/3xd	−9d	20	11½*	4 0 0	61/6	41/6
Automatic Tel. & El.	£1	72/6		15	15	—	73/-	57/3
Babcock & Wilcox	£1	63/9		18	12*	3 15 3	63/9	47/3
Baldwin, H. J.	2/-	4/9	+3d	20	20	8 8 6	5/6	3/9
Bakelite	10/-	26/3		12½	12½	4 15 3	27/6	23/6
British Aluminium	£1	37/6		12	10	5 6 8	40/-	33/9
B.I. Callender's	£1	46/6	−6d	10	10	4 6 0	48/-	37/9
B.I. Callender's 6% Pref.	£1	26/3		6	6	4 11 6	26/6	24/3
British Thermostat	5/-	26/3		35	27½*	—	26/3	12/-
British Vac. Cleaner	5/-	13/6		25	25	9 5 3	14/6	11/6
Brook Motors	10/-	50/-		20	20*	4 0 0	50/-	33/3
Brush Ord.	5/-	8/3	+9d	4	6	3 12 9	8/3	3/6
Bulgin, A. F.	1/-	3/6		30	30	8 11 6	3/7	3/2
Burco	5/-	18/-	+6d	35	35	4 17 3*	18/-	12/1
Chloride El. Storage	£1	63/9	+1/3	20	12½*	3 18 7	68/-	46/6
Clarke Chapman	£1	70/-		17½	20	—	73/-	47/6
Cole, E. K.	5/-	32/-	+9d	25	27½	4 6 0	38/9	22/6
Cossor, A. C.	5/-	9/6		10	10	5 5 3	11/-	7/-
Crabtree	10/-	28/9		17½	17½	6 1 9	29/6	23/9
Crompton Parkinson Ord.	5/-	19/-		11½	20	5 5 3	19/6	14/-
De La Rue	5/-	18/9		Nil	20	5 6 8	21/-	12/3
Decca	4/-	46/-		150	35*	—	46/-	32/-
Desoutter	5/-	23/9	+1/3	18	20	4 4 3	23/9	16/1
Dewhurst	2/-	7/-		19	19	5 8 6	6/6	5/1
Dictograph Tel.	2/-	7/3	−9d	20	20*	5 10 3	8/-	5/2
Dubilier Condenser	1/-	4/3	−3d	25	25	—	5/3	3/3
E.M.I.	10/-	20/9	−1/3	12	8	3 17 0	23/-	11/3
Electrical Components	5/-	16/3		20	20	6 3 0	16/3	10/9
Elec. Construction	£1	62/-		15	15	4 16 0	62/6	53/-
Enfield Cable Ord.	£1	22/6	−1/3	5	Nil	Nil	25/9	16/6
English Electric	£1	57/6	−1/3	15	10*	3 9 6	59/-	38/-
English Electric 3½% Pref.	£1	16/9		3½	3½	4 9 7	16/9	15/3
Ericsson Tel.	5/-	31/3	+2/6	22†	25†	2 0 0*†	31/3	22/9
Ever Ready	5/-	24/9	−6d	35	40	—	26/3	17/9
Falk Stadelmann	£1	40/-		15	15	7 10 0	41/-	36/6
G.E.C. Ord.	£1	50/-		11½	12½	5 0 0	53/-	37/6
G.E.C. 6½% Pref.	£1	27/-		6½	6½	4 16 3	27/3	26/6
General Cables	5/-	17/3		30	30	8 14 0	17/3	16/3
Greenwood & Batley	£1	51/3		17½	17½	6 16 6	51/3	40/3
Hackbridge Cable	5/-	14/9	+3d	20	20	6 15 6	15/9	11/3
Hackbridge & Hewittic	5/-	22/6		20	25	5 11 0	23/3	16/10
Hall Tel. Acc.	10/-	13/-		10	10	7 13 10	13/-	10/6
Heatrae	2/-	5/6		12½	12½	4 11 0	5/6	4/-
Henley's	10/-	19/9xd		10½	10½	5 6 3	20/3	15/6
Holophane	5/-	17/6		20	20	5 14 3	17/6	13/1

* After capital bonus. † Free of income tax.

The above quotations are based upon middle prices in the Stock Exchange Daily Official List.

on the basis of a prospective total of 10 per cent, and a future yield therefore of 5 per cent. A glance down the yield column in the accompanying share list discloses that many other share prices might be difficult to explain simply on the basis of the rates of dividend paid for 1953. Hopes in this connection rest basically, of course, on the general evidence of increased production and active business, which will presumably find some reflection in many company earnings. In addition, there is the less tangible factor of boardroom tendency to relax a little the austere dividend policies.

in Electrical Investments

Company or Board	Nom. Value	Middle price 27th Sept.	Week's Rise or Fall	Dividend Previous	Dividend Last	Yield % £ s d	1954 Highest	1954 Lowest
Equipment and Manufacturing—continued.								
Hoover	5/-	44/9	−1/6	25	45	5 0 6	51/-	26/3
I.C.I.	£1	40/-	+1/-	13	15	3 15 0*	40/3	26/6
Int. Combustion	5/-	29/3xd		15	20	3 8 6	30/-	14/6
Johnson & Phillips	£1	51/3		15	15	5 17 0	52/6	47/6
Lancashire Dynamo	£1	58/-		12½	14	4 15 9	59/6	43/-
Lawrence, Scott	5/-	22/6		15	20	4 9 0	25/-	14/-
Lister, R. A.	£1	32/6		9	12	—	32/9	22/6
London Elec. Wire	£1	51/3		15	10*	3 18 0	51/3	38/-
Lucas, J.	£1	38/9		9½	10¾	—	40/-	25/3
Mavyat & Scott	2/-	7/9		22½	25	6 9 0	7/9	5/11
Mather & Platt	£1	47/6		12½	15	—	47/6	32/-
Metal Industries	£1	34/-	−6d	12	9	5 6 0	42/3	29/6
Midland Elec. Mfg.	£1	67/6		15	15	4 9 0	67/6	63/-
Morphy-Richards	4/-	24/-		40	40	—	25/-	11/4
Murex	£1	49/-	−1/-	15	15	6 2 6	57/-	49/-
Newman Ind.	2/-	2/4½		10	10	8 8 5	2/6	2/-
Oldham & Son	1/-	3/3		17½	17½	5 7 8	3/4	2/5
Parnall (Yate)	5/-	11/-	+6d	6	8	3 12 9	11/-	4/3
Parsons, C. A.	£1	55/-		12½*	7½*	2 14 6	60/-	38/1
Plessey	10/-	56/-	−3d	25	30	—	58/9	37/10
Pye Deferred	5/-	28/9	−1/3	20	20*	3 9 6	32/6	15/7
Revo	10/-	14/-		27½	9*	6 8 6	20/3	14/-
Reyrolle	£1	85/-xd		12½	13¾	3 4 9	92/6	66/-
Rheostatic	4/-	15/-		19	20	5 6 8	15/9	11/-
Richardsons Westgarth	5/-	11/9		15	15*	6 7 8	12/3	6/6
Scottish Cables	4/-	21/9		20	27½	5 1 3	21/3	12/11
Siemens Ord.	£1	37/6	−6d	10	10	5 6 9	43/9	33/9
Smith (England), S.	4/-	13/6	−3d	12½	15	—	13/6	7/8
Southern Areas	£1	24/6		6	7½	6 2 6	27/6	17/6
Strand Elec.	5/-	9/3		17½	17½	9 9 3	9/3	8/3
Sturtevant	5/-	45/-		18·1†	18·9*†	2 2 0†	45/-	29/-
Sun Elec.	£1	32/6		15	15	9 4 8	32/6	27/6
Switchgear & Cowans	5/-	12/9		22½	10	3 18 6	13/7	9/9
Taylor Tunnicliff	5/-	11/-		25	12½*	5 13 9	12/4	10/7
T.C.C.	10/-	35/-xd		20	30*	—	36/3	21/3
T.C. & M.	£1	33/6		10	8½*	5 1 6	34/6	30/3
Telephone Mfg.	5/-	9/6		10	10	5 5 3	9/6	7/6
Thorn Elec.	5/-	26/-		12½	20	3 17 0	27/-	13/3
Thornycroft	£1	43/-	−1/-	15	15	6 19 6	47/6	33/4
Tube Investments	£1	75/-	+1/3	15*	15	4 0 0	75/-	60/3
Vactric	5/-	17/-		Nil	10	2 18 9	18/9	7/6
Veritys	5/-	9/3		10	12½	6 15 2	9/3	5/-
Walsall Conduits	4/-	51/3		70	70	5 9 4	52/6	44/-
Ward & Goldstone	5/-	19/-		45	50	—	39/6	21/-
Watford	2/-	37/3	+3d	25	22½*	—	7/3	4/7
Westinghouse Brake	£1	6/3		14	15	3 19 0	77/-	60/9
West, Allen	5/-	76/9	+3d	15	17	5 4 6	16/9	12/7
Wolf Electric	5/-	16/3		15	17½	5 7 9	14/9	11/-
Trusts, Transport and Communications								
Anglo-Am. Tel.:								
A Ord.	100	86		—	6	6 19 6	89½	80
Ord.	100	54½		—	3	6 17 6	55½	52
Anglo-Portuguese	£1	24/3		8	8	6 12 0	24/3	21/-
Brit. Elec. Traction:								
Def. Ord.	5/-	64/6	+2/-	35	50	3 18 0	65/-	39/1
Cable & Wireless:								
Ord.	£1	42/-	−6d	8	9	4 5 9	49/6	26/2
4% Loan	100	98½		4	4½	4 1 3	98½	95½
Calcutta Trams	£1	21/6		2½†	6†	5 11 6†	24/6	17/1
Cape Elec. Trams	£1	15/6		5½	7	9 13 6	17/6	12/4
Marconi Marine	£1	32/9	+3d	10	10	6 2 3	33/9	27/6
Oriental Tel. Ord.	£1	90/-		16	16	—	95/-	82/6
Telephone Props.	£1	5⅛		8	8	—	5½	4⅛
Telephone Rentals	5/-	10/-		10	10	5 0 0	10/6	9/-

Effect of E.P.L.

In addition to the factors mentioned above in connection with coming dividend prospects, there is also to be considered the effect which the ending of the excess profits levy will have on net distributable company earnings. This is one of the first items to be taken into account nowadays in the assessment of a share's prospects. To illustrate its importance, two rather extreme cases may be recalled: for 1953, C. A. Parsons paid in a sum of £366,000, whereas the net amount of the ordinary dividend was only £128,000. In the case of A. Reyrolle the figures were respectively £420,000 and £196,000. There are, of course, many more permanent reasons for the popularity of the shares concerned, but this levy position must contribute substantially to the quotation of the shares concerned on yield bases of only about 2¾ and 3¼ per cent respectively.

Chloride Electrical Offer

Lists opened on Tuesday of this week in connection with applications for the £1½ million Chloride Electrical Storage "A" ordinary stock recently repatriated from America. Dealings were expected to begin about to-day (Friday). The offer of the shares at 63s presented an opportunity to acquire a highly-regarded investment at a little below recent market prices, and without the expenses of commission and transfer stamp. It was expected, therefore, to be warmly received. This forms part of a total issue of £3·1 million "A" stock, which ranks equally with £1·2 million of "B" stock except that the latter ordinarily carries no vote. Buyers of the newly issued stock are not entitled to the 5 per cent interim dividend about to be paid on account of the current year. After dipping to 62s 3d, the price of Chlorides recovered to 63s 9d.

Earnings and Dividends

In the prospectus accompanying the offer of the Chloride "A" stock it is stated that annual profits (before U.K. tax) of the past five years averaged £1,894,000. For 1953, the figure was £2,209,000 of which, after deduction of the preference dividend, approximately a quarter was distributed in gross dividends on the ordinary stocks. In the ordinary course of events, the statement indicates, the results for 1954 may reasonably be expected to compare favourably with the five-year average. This year's 5 per cent interim is at the same rate as that for last year, but on capital subsequently doubled by a capitalization issue. The final was 10 per cent on the capital so increased. Current market expectations would be satisfied this time by a total of 15 per cent.

REPORTS and DIVIDENDS

The General Electric Co., Ltd.—The annual meeting was held on 23rd September, Sir Harry Railing (chairman and joint managing director) presiding. In his review of the past year's activities Sir Harry said that there was an increase both in production and in the sales of capital and consumer goods. Since 1947 the company had spent £14 million on plant and buildings alone. These increased facilities enabled them to increase their sales both at home and overseas, over the whole range of capital goods. In the consumer goods market, where in the previous year a sharp decrease was reported, they foretold a general improvement at home on account of the lifting of the ban on promotional activities for domestic appliances, and the expansion of television throughout the country. This forecast had been realized. Abroad, as well, sales of consumer articles had increased, compared with the previous year, but it must be remembered that the increase started from the low level established by the restrictions which had been imposed by most Commonwealth countries. These restrictions still persisted and even where they had been partly lifted, had resulted in the permanent establishment of secondary industries. Often economically indefensible, they harmed not only our home industries, but also, until there was a basis for economic production, the overall economy of their own countries.

The total orders received during the year were less than in the previous year, mainly in connection with capital goods. This decrease, coupled with the large increase in their productive capacity for capital goods, had reduced the volume of orders in hand. It carried with it the advantage that they could offer competitive deliveries in most goods, but it increased the necessity for an all-out effort to compete in quality, delivery and price in every one of the fields which they covered and in every territory. In the home market they expected a continuation in the volume of orders both for capital and consumer goods. There were signs of plant extensions by the B.E.A. at the rate of 2,000 MW per year. The National Coal Board was bound to continue the mechanization of mines and the Transport Commission had given indications of going ahead with the electrification of the railways. With the removal of the ban on publicity by the Ministry of Fuel and Power, home electrification would go ahead.

In the export field the hard fact had to be faced that we must meet the competition of countries whose industries bore a lower rate of taxation and whose labour rates were much below our own. These differences must ultimately level themselves out, otherwise it would be increasingly difficult to maintain even our present share of the world's markets and our higher living standards. After stressing the importance of not widening the difference in labour costs already existing between us and foreign competitors, Sir Harry dealt with some of the company's achievements during the past year.

In the field of research, foremost was the investigation into the properties of materials in a state of purity not previously realized. This work was associated with the extensive programme of semi-conductor research, which required the production of large quantities of extremely pure metals. A new approach to the problems of interior lighting had been developed by their illuminating engineers. Among the new electronic devices developed by the laboratories was a cold cathode tube with an extremely long life.

There had been a continued flow of contracts for large turbo-alternators. With fourteen 60 MW turbo-generators on order and demands for plant of ever-increasing size both for steam and hydro-electric stations, the testing plant, which was commissioned at the Witton Engineering Works last year, had proved of the utmost value. The information obtained with machines running under full load conditions, had enabled them to improve still further the performance of such machines and to develop their designs for generators of 120 and 240 MW. Special study had been given to the application of atomic energy for the generation of electricity, with the object of undertaking the design and construction of complete atomic power stations.

In the field of transport, the multiple train units for which they supplied the electric motors and control gear, were now in service on the Manchester–Glossop line. During the year the Pirelli-General Cable Works had received a further order of over £2,000,000 for cabling and civil engineering work in connection with the frequency changeover scheme of the Southern Region of British Railways.

In the mining field the demand for winding plant showed no signs of falling off and many a.c. winders now in hand were equipped with their new system of dynamic braking and automatic speed control. Special equipment supplied to the Atomic Energy Authority included large numbers of frequency changers and high frequency machines, as well as furnaces and furnace pots for the production of purified uranium. Included in equipment supplied to Canada, was the 301 kV oil-filled cable installed by the Pirelli-General Cable Works for the Kitimat–Kemano project of the Aluminum Co. of Canada, which was believed to be the first cable to operate at so high a voltage in the whole of the North American continent.

They had maintained their position as major suppliers of telephone exchanges, cable and radio equipment for trunk communications to the British Post Office and overseas administrations. Through their Fraser & Chalmers Works they continued to supply aircraft lifts of the latest inboard and outboard designs for aircraft carriers. Both Chamberlain & Hookham and Salford Electrical Instruments, Ltd., had had a good year and Watson & Sons (Electro-Medical), Ltd., had continued to play a leading part in the provision of X-ray equipment.

With regard to consumer products, the range of refrigerators had been extended to include an 8 cu ft model and a 3 cu ft model suitable for small families. They had retained their share of the market for electric cookers and the wide range of products for use in the home. They had maintained their lead in the field of lighting, and fresh impetus had been given to the sale of tubes for fluorescent lighting by the introduction of two new tube colours, one having a higher efficiency than any previous tube, and the other giving considerably improved colour rendering. A noteworthy street lighting installation was that in Union Street, Aberdeen, the first main street in the world to be completely lit by cold cathode fluorescent lighting.

The Palestine Electric Corporation, Ltd.—The accounts for 1953 show a surplus on operation and sundry receipts, after meeting all charges, except taxation, of I£3,486,301, as compared with I£451,579 for 1952. Taxation requires £600,000, and after deducting directors' fees, etc., and placing £2,095,420 to reserve for depreciation, the balance carried to profit appropriation account is £562,323 (against £36,344). After payment of the preference stock dividends, the balance carried forward is £996,782 (against £508,966 brought in).

In his statement, Viscount Samuel (chairman) reviewed the course of events leading to the offers that had been made by the Government of Israel to purchase the ordinary and "A" ordinary stock and shares of the Corporation, and said that it had been agreed that within one month after registration of the purchase of shares by the Government, the present directors would resign as a body, and an extraordinary meeting would be held in Israel for the purpose of electing new directors. Mr. G. Bradlaw would at the same time vacate the office of secretary of the Corporation.

The chairman said that the first 50 MW unit in the Reading power house was commissioned in May, 1953, in good time to meet the heavy seasonal irrigation load, and the second 50 MW unit was commissioned in March last, making the total available generating capacity, excluding the Jordan hydro-electric works, 230 MW. Over 860 million kWh was generated in 1953, an increase of 125 million kWh as compared with 1952, and sales were 722·6 million kWh, an increase of 85 million kWh. The maximum load reached 178 MW (against 131 MW).

Hackbridge Cable Holdings, Ltd.—The annual meeting was held on 21st September, Mr. C. I. Steen (chairman), presiding. In his circulated statement, the chairman, in referring to the fall in trading as compared with the previous year, said that last year he indicated that the results would not reach the same high figure. At the same time output achieved compared favourably with earlier years, bearing in mind the variations in commodity prices. Trading since the end of the year under review had continued to be satisfactory, and the demand for their electric cables, power transformers and capacitors was constantly increasing. Good progress was being made in sheathing cables with aluminium by the direct extrusion process as an alternative to lead.

A. C. Cossor, Ltd.—The annual meeting was held on 23rd September, Lord Burghley (chairman), presiding. In the course of his circulated statement, the chairman said that in the television field they shared the good year which the trade enjoyed largely owing to heavy "out of season" sales induced by the Coronation. Near the end of the year sales tended to revert to the seasonal pattern. The current year had begun with some slackness in the trade, but the removal of the restrictions on hire-purchase had released a considerable latent demand and they looked forward to a better year than at one time seemed likely. Sales of radio receivers remained unusually low during the first part of the year, but later they took a definite turn for the better.

[*Continued on p. 541*

MARTINDALE
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Mica Undercutting by the use of files (and "sweat") has always been regarded as a method productive of satisfactory results.

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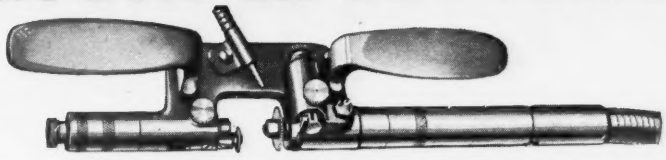
Also available with "U" cutters.



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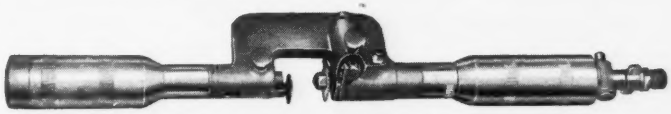

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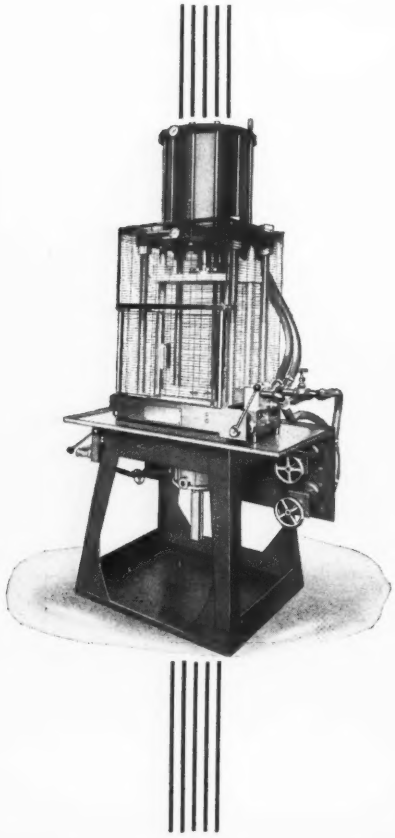

Alkyd (Resinous Chemicals Ltd. new fast curing thermo-plastic)

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by using existing slow presses. This material cures in a few seconds and must be used on fast machines. The only fast ones are compressed air operated, and the machine illustrated has been specially developed for Alkyd mouldings. An economic press at the right price.

QUICK DELIVERY

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WEST BROMWICH——ENGLAND

In the design and manufacture of electronic equipment for the operation and safety of aircraft they had developed a large surveillance radar equipment which had been installed for both military and civil use.

Scottish Cables (South Africa), Ltd.—The trading profit for the year to 30th June last amounted to £203,271, as compared with £373,562 for the preceding year, and after deducting depreciation and audit and £52,800 for taxation, the net balance is £121,179 (against £229,688). General reserve receives £50,000 and the ordinary dividend for the year is maintained at 12½ per cent. The balance carried forward is £56,103 (against £59,924 brought in).

The Sturtevant Engineering Co., Ltd., is paying an interim dividend of 3¼ per cent, tax free. This is at the same rate as for the previous year, but is payable on capital increased by a 12½ per cent free scrip issue.

It is proposed to double the authorized capital to £1,000,000 and to make a free issue of new shares on a one-for-one basis from general reserve. The consent of the Capital Issues Committee has been obtained. The new shares will not rank for the above interim dividend, and the directors state that it must not be taken as an indication that the amount to be distributed annually will be increased.

Permali, Ltd., in a circular letter to shareholders, has announced that the consideration to be paid for the acquisition of the whole of the issued capital of Hordern-Richmond, Ltd., recently announced is £100,000 in cash and 750,000 shares of 2s each. To permit of the issue of shares to the vendors of Hordern-Richmond, Ltd., an extraordinary meeting is being held on 4th October, to increase the authorized capital of Permali, Ltd., to £350,000 in ordinary shares. In the near future it is the intention of the directors to offer to members a further 500,000 shares for subscription.

The Chloride Electrical Storage Co., Ltd.—The application list opened and closed on Tuesday last for an offer by Lazard Brothers & Co., Ltd., of £1,573,688 "A" ordinary stock at 63s per £1 stock. As reported in our last issue the holding of the Electric Storage Battery Co., of Philadelphia, of £1,573,688 of "A" ordinary stock of the Chloride Co., has been purchased by Lazard Bros.

W. T. Henley's Telegraph Works Co., Ltd., has declared an interim dividend on the ordinary capital of 2½ per cent (unchanged).

Aberdare Cables (Holdings), Ltd., has announced an interim dividend of 7½ per cent (against 5 per cent).

The Telephone & General Trust, Ltd., is paying an interim dividend of 3 per cent (same) on increased capital.

New Companies

Washington Transformers, Ltd.—Registered 1st September. Capital £100. Manufacturers, hirers and repairers of and dealers in transformer tanks with or without cooling elements, radiators and parts. Directors: S. Hunter and G. Blair. Regd. office: Washington Steel Works, Washington, Co. Durham.

Electrical Consultancies (Midlands), Ltd.—Registered 13th September. Capital £500. Electrical and mechanical engineers and consultants, etc. Directors: C. McNeil, G. F. Ross, R. A. Simons and Wm. B. B. Edge. Regd. office: Whateley Chambers, Horse Fair, Banbury, Oxon.

Neon Designs, Ltd.—Registered 31st August. Capital £100. Manufacturers and repairers of and dealers in neon and electric and other signs, etc. Directors: A. W. A. Howell and Ruth S. Howell. Regd. office: 1a, Eastern Avenue, Reading.

W. Wilkinson & Co. (Halifax), Ltd.—Registered 8th September. Capital £2,000. Electrical engineers, electrical installation contractors, etc. Directors: J. Mitchell and J. H. Thorp. Regd. office: Excelsior Works, Bedford Street North, Halifax.

Liquidation

Eastwood Radio, Ltd.—Members' voluntary winding-up. Meeting of members on 1st November at 239, Temple Chambers, Temple Avenue, London, E.C.4, to receive an account of the winding-up by the liquidator, Mr. N. G. Reeves.

Bankruptcies

A. Jager, late of 64, Cholmeley Gardens, London, N.W.6, and 408, Edgware Road, W.2 (present address unknown), electrical engineer.—Receiving order made 15th September on a creditor's petition. First meeting to-day (Friday) and public examination 27th October, both at Bankruptcy Buildings, Carey Street, London, W.C.2.

E. Vasey, 21, Bridge Road, Bishopthorpe, York, electrician.—Trustee, Mr. W. H. Meredith, 29, East Parade, Leeds, 1, Official Receiver, released 15th September.

J. H. Thompson and **H. A. Why,** lately trading in co-partnership under the name of Southern Radio T.V. Electrical Services, at 52, Wellington Mews, Hastings, electricians.—First and final dividend of 4½d in the £, payable on and after 12th October at the Official Receiver's office, 8, Old Steine, Brighton.

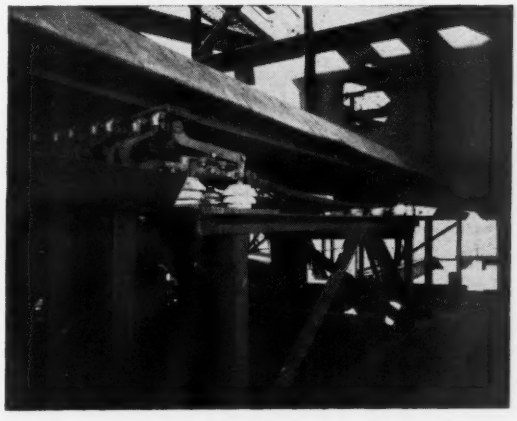
Transporters at Bidston Dock

Two large electrically operated transporters, each weighing 600 tons, have recently been put into operation at Bidston Dock, Birkenhead. Constructed by Joseph Booth & Bros., the transporters are to be used for unloading iron ore from ships at the dockside into waiting road, rail or barge transport for dispatch to the Hawarden Bridge Steel Works, near Shotton, of John Summers & Sons, Ltd. Each grab has a capacity of six tons and the time taken to pick up and discharge a grab-load is 60 seconds, giving each transporter a capacity of over 350 tons an hour.

The complete current collection equipment has been designed, manufactured and installed by British Insulated Callender's Cables, Ltd., and its subsidiary British Insulated Callender's Construction Co., Ltd., in association with R. & J. H. Rea, Ltd., Joseph Booth & Bros. and Wm. Cory & Sons, Ltd. The 140ft high transporters have a number of unusual features. They are the only two in Great Britain which can unload either on to land or into barges, the length of the transverse boom (219ft) allowing the grab to discharge into barges lying on the off-shore side of the ships. The transporters themselves can move along the quay on rails for a distance of 1,000ft. An underground duct runs behind the transporters parallel with the rails, and the current collectors of each transporter, together with the T-bars carrying the current, are therefore completely enclosed. Installed in the duct are three 1,000ft copper T-bars, along which run the three current collectors fitted to each transporter. These are provided with 1,000 A twin head carbon inserts and the T-bars are fixed to the side of the underground duct by means of steel brackets and insulated supports.

The current collection equipment for the cross-travelling cranes with their huge grabs presented difficulties. The 219ft booms are hinged so that the 93ft end section can be raised clear of the superstructure of ships to allow the whole transporter to move along from hold to hold and, as a result, special T-bar and trolley wire fittings had to be installed at the hinge. A three-phase and earth 440 V system is used and each crane is provided with four main conductors in the form of 1½in by 1½in by ¼in copper T-bars as well as four control conductors of 1/0 s.w.g. grooved copper trolley wire. This necessitated sixteen collectors being installed operating in parallel, two to a conductor. The collectors for the main conductors are of the heavy duty, porcelain insulated, spring type.

Current collection equipment for cross-travelling cranes at Bidston Dock, Birkenhead



NEXT WEEK'S EVENTS

Organizers of electrical functions are advised to make use of the "Electrical Review" clearing house, Room 231, Dorset House, Stamford Street, London, S.E.1, to ascertain that proposed dates for their functions do not clash with others already arranged

Monday, 4th October

BIRMINGHAM.—James Watt Memorial Institute, Great Charles Street, 6 p.m. I.E.E. South Midland Centre. Chairman's Address, by A. R. Blandford; annual general meeting and conversazione.

BOLTON.—Balmoral Hotel, Bradshawgate, 7.30 p.m. A.S.E.E. Bolton Branch. "Switchgear, Protection and Capacity," by Mr. Tyrrell.

BRISTOL.—S.W.E.B., Colston Avenue, 6 p.m. I.E.E. Western Centre. Chairman's Address by A. N. Irens.

ILFORD.—Angel Hotel, 8 p.m. A.S.E.E. North East London Branch. Film show.

LEEDS.—Great Northern Hotel, 7.30 p.m. A.S.E.E. Leeds Branch. "Electronics in Industry," by A. Williams.

LONDON.—Caxton Hall, 7 p.m. E.P.E.A. London Technical Group. "Modern Generating Plant Problems," by C. C. Hitchen.

NEWCASTLE-UPON-TYNE.—King's College, 6.15 p.m. I.E.E. North-Eastern Radio & Measurements Group. Chairman's Address, by D. H. Thomas.

Liberal Club, 98, Pilgrim Street, 6.30 p.m. North East Electrical Club. Annual general meeting and presidential address.

STAFFORD.—Technical College, 7 p.m. I.E.E. North Staffordshire Sub-Centre. Chairman's Address, by J. M. Ferguson.

Tuesday, 5th October

EDINBURGH.—Carlton Hotel, North Bridge, 7 p.m. I.E.E. South-East Scotland Sub-Centre. Chairman's Address, by E. O. Taylor.

25, Charlotte Square, 7 p.m. Incorporated Plant Engineers, Edinburgh Branch. "Trends in Industrial Instrumentation," by A. B. Dryburgh.

ELTHAM.—Congregational Church Hall, Court Road, 8 p.m. A.S.E.E. South East London Branch. "Atomic Research."

HAMMERSMITH.—Windsor Castle Hotel, 134, King Street, 7.30 p.m. A.S.E.E. West London Branch. "The General Principle of h.v. and l.v. Networks that Supply the West End of London," by F. B. Evitt.

LEEDS.—1, Whitehall Road, 6.30 p.m. I.E.E. North Midland Centre. Chairman's Address: "Management and Men," by W. A. Crocker.

LONDON.—At the Royal Society of Arts, John Adam Street, Adelphi, 7 p.m. Incorporated Plant Engineers, London Branch. "Controlled Air Conditions in Factories," by D. J. Hyam.

MANCHESTER.—Engineers' Club, Albert Square, 6.30 p.m. I.E.E. North-Western Centre. Chairman's Address by Prof. E. Bradshaw.

OLD PORTSMOUTH.—B.E.A.. Conference Rooms, High Street, 7.30 p.m. A.S.E.E. Portsmouth Branch. Lecture.

RUGBY.—College of Technology & Arts, 6.30 p.m. I.E.E. Rugby Sub-Centre. Chairman's Address: "The Changing Outlook in Electrical Measurements," by D. Edmundson.

Wednesday, 6th October

CARDIFF.—College of Technology, Cathays Park, 6.30 p.m. British Institution of Radio Engineers, South Wales Section. "The Design of Switching Circuits," by Prof. Emrys Williams, followed by the annual general meeting.

GLASGOW.—39, Elmbank Crescent, 7 p.m. I.E.E. South-West Scotland Sub-Centre. Chairman's Address, by R. J. Rennie.

HARRINGAY.—Queens Head, 677, Green Lane, 7.45 p.m. A.S.E.E. North London Branch. "The Association," by E. A. Bromfield.

MANCHESTER.—Engineers' Club, Albert Square, 1.30 p.m. North Western Fuel Luncheon Club. Annual general meeting, followed by "King Cotton and King Coal," by W. T. Winterbottom.

MIDDLESBROUGH.—Cleveland Scientific & Technical Institute, 6.30 p.m. I.E.E. Tees-Side Sub-Centre. Chairman's Address, by E. J. Grubb.

PORTSMOUTH.—College of Technology, 6.30 p.m. I.E.E. Southern Centre. Chairman's Address, by E. A. Logan.

PRESTON.—Chamber of Commerce, 49a, Fishergate, 7.30 p.m. A.S.E.E. Preston Branch. "The Development of Alloys for Electric Heating Elements," by H. Hodges.

SOUTHAMPTON.—Polygon Hotel, 7.30 p.m. Incorporated Plant Engineers, Southampton Branch. "The Control of Maximum Demand and Power Factor," by A. W. Ingram.

WEST BROMWICH.—At Kenrick & Jefferson, Ltd., 7.30 p.m. Institute of Industrial Supervisors, West Bromwich Section. "Electronics in Industry," by D. A. Ellis.

Thursday, 7th October

CROYDON.—Café Royal, North End, 8 p.m. A.S.E.E. South London Branch. "Electrical Hazards and Electrical Safety,' by Col. S. J. Emerson.

GLASGOW.—At the Institution of Engineers and Shipbuilders, Elmbank Crescent, 6.30 p.m. British Institution of Radio Engineers, Scottish Section. Annual general meeting followed at 7 p.m. by a debate on "Does Industry want Electronics?"

LIVERPOOL.—Liverpool University Buildings, 7 p.m. British Institution of Radio Engineers, Merseyside Section. "The Liverpool University Cyclotron," by M. J. Moore, followed by a visit of inspection.

LONDON.—Savoy Place, W.C.2., 5.30 p.m. Institution of Electrical Engineers. Presidential Address by E. Eccles.

PETERBOROUGH.—Dujon Café, Market Place, 7.30 p.m. Incorporated Plant Engineers, Peterborough Branch. "Plant Maintenance and Productivity," by R. A. Rogers. (Joint meeting with the Institution of Production Engineers).

Friday, 8th October

CHELMSFORD.—Shire Hall. E.I.B.A. Essex Branch. Ball.

LIVERPOOL.—Reece's Restaurant, Parker Street. Incorporated Plant Engineers, Merseyside & North Wales Branch. Annual dinner.

NEWCASTLE-UPON-TYNE.—Grey Hall, King's College, 6.30 p.m. I.E.E. North Eastern Students' Section. Chairman's Address: "Inventions and their Influence on Industrial Organization and Management," by W. G. Bryce.

NOTTINGHAM.—Victoria Station Hotel. Institution of Heating and Ventilating Engineers, East Midlands Branch. Ladies' evening.

Farm Electrification

The three-day course on farm electrification, held last week in Bristol, for the staffs of the Midlands, the South Wales and South Western Electricity Boards, and organized by E.D.A., reference to which was made in our 17th September issue, was opened by Mr. S. F. Steward (chairman of E.D.A., and chairman of the South Western Electricity Board), who said that the first five-year programme—to take electricity to a further 60,000 farms and at least 260,000 rural homes—would cost the industry about £50 million. This big national investment in the countryside could be justified only if the farmers and all rural consumers made the fullest use of the service provided. In some rural areas there were only a few scattered premises to the square mile. Progress in extending electricity supplies to these remote areas would depend increasingly on the success of the commercial staffs in showing farmers how a full use of electricity would cut their labour and fuel costs and raise output. The farm electrification course was designed to give staffs the best possible equipment in the campaign to bring new light and life to the countryside.

Mr. R. A. Bayetto, rural electrification officer of the Electrical Development Association, in an address, said that the new programme of rural electrification which came into being this year was intended to give electricity supplies to 85 per cent of farms, cottages and houses in the countryside by about 1963. This would necessitate liaison with even non-consumers on the part of Electricity Boards' staff, who were in daily contact with country people. By such liaison there would be built up future markets and at the same time goodwill by giving helpful advice.

In the course of a paper on "Agriculture and Good Husbandry," Mr. S. R. Wragg (Economics Department, Bristol University) said that farmers now spent from £4 and upwards per annum per acre on power and machinery and this represented about 12 to 20 per cent of total costs per acre. Capital invested in power plant and machinery averaged about £10 per acre, but varied widely from farm to farm. When considering the application of electricity to the farm the main criterion to-day should be the relative cost of current, depreciation and plant maintenance in comparison with other sources of heat and power. Marginal savings in job performance time were not at present of such vital importance as the actual cost of the power and plant itself. While the number of grass dryers nearly trebled between 1948 and 1952 the increase during the last two years had been less than 20 per cent and it was doubtful whether even this rate of increase would be maintained unless there was a sudden and unexpected deterioration in the animal feed position.

GENERATION AND DEVELOPMENT

Supplies to Farm Cottages

At last week's meeting of the Southern Electricity Consultative Council at Bournemouth, at which Group Captain J. C. M. Bay presided, Mr. Renwick said he wished to correct the impression given by press reports of his remarks at the last meeting in connection with supplies to farm cottages. In mentioning a case where the Board had quoted £300 for an extension and he had obtained quotations of £70 or £80 from an outside contractor, it had not been made clear that the two quotations were not for identical materials. The Board's quotation was for its standard form of construction whereas that of the outside contractor was for a method of construction which Mr. Renwick considered adequate to meet that particular case. The point he had wished to make was that in cases of supplies to isolated cottages, when further development was improbable and the use of electricity would be quite small, the standard materials used by the Board were too costly and not necessary. The Board had agreed to look into the matter and report to the Council.

Early Closing of Showrooms

The Southern Electricity Board has been recommended by the Consultative Council to open a number of showrooms in shopping areas on Saturday afternoons for a trial period of twelve months. It was stated at the last meeting of the Council that the majority of other Boards opened at least some showrooms on Saturday afternoons.

Snowdonia Water Power

At a meeting last week of the Snowdonia Park Joint Advisory Committee Sir Patrick Abercrombie, planning consultant to the Committee, said that from the amenity point of view the British Electricity Authority's revised scheme at Blaenau Ffestiniog was a great improvement on its original plan. There would be no long leats, tunnels or spoil heaps, virtually no new access roads and no robbing of watersheds.

Nevertheless skilful treatment would be necessary in the handling of the dam, power station and transformer station and the Committee would have to watch the development very carefully.

Consultative Councils

Asked by the Rural District Councils' Association for its views on the subject, Penrith (Cumberland) R.D.C. has suggested that Consultative Councils should be renamed Consumers' Councils, and these organizations should have some technical staff to give an independent opinion on technical matters.

Toronto Load Growth

Between 1946 and 1952 the annual load growth of the Toronto Hydro-Electric System was approximately 16,000 kW. Normally, therefore, the 27,600 kW of additional capacity available last year would have been large enough to reduce the existing overload of 11,600 kW, but in fact there was a rise in the peak load of 45,373 kW. To meet this situation the capital programme has been substantially increased. In 1953 a total of 2,287 million kWh was sold, an increase of nearly 7 per cent over the previous year. Work continued on the installation of a city-wide distribution system of 60 c/s, 120/240 V and also on the replacement of overhead lines by underground cables. The street lighting improvement programme for the main thoroughfares was largely completed.

Link-up in New Zealand

The Buller district of New Zealand is now linked with the main South Island electric power network, via Arthurs Pass, Inangahua and Waimangaroa. The Minister in charge of the State Hydro-Electric Department, the Hon. W. S. Goosman, said the linking of Buller, on the west coast, with the main system marked yet another stage in the joining up of the various parts of the South Island. Later, the west coast would also be joined to the Nelson-Marlborough system by a new line now under construction. This would make power from the new Braeburn station available to the whole of the north-western section of the South Island.

New Substation at Sale

A new high voltage substation at Ventnor Avenue, Sale, Cheshire, switched on by the Mayor of Sale (Councillor L. Bethell), on 14th September, is another example of the North Western Electricity Board's large-scale system development. Sir Joseph Hallsworth, chairman of the Board, presided at the opening ceremony which was attended by members and officials of Sale Corporation. Among Board officials present were Mr. H. G. Bell (chief engineer) and Mr. F. Linley (manager of No. 1 Sub-Area). The new substation has been erected to meet a remarkable growth in load in and around this area of North Cheshire; in 1923 there were only 2,000 consumers in Sale, whereas to-day that number has increased to 17,000 and during the same period sales per annum have increased from 1·7 million to 27·6 million kWh.

The new substation, one of seven of its size so far constructed in the North West, houses two 132/33 kV transformers, each of 45,000 kVA, and contains control equipment which will enable it to be supervised by the Board's No. 1 Sub-Area central control in Manchester.

The Mayor of Sale switching on the new substation. With him is Mr. F. Linley, manager of the Board's No. 1 Sub-Area

Low Voltage Complaint

Whitby R.D.C. has drawn the attention of the North Eastern Electricity Board to the poor electricity supply at Glaisdale, especially at week-ends. The Council states that consumers cannot use electrical appliances properly.

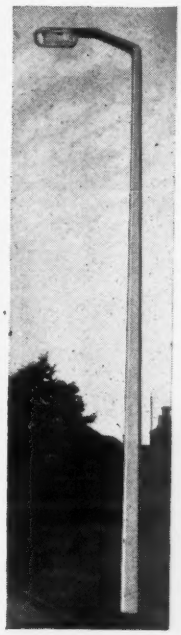
Street Lighting Notes

NEWCASTLE-ON-TYNE City Public Lighting Committee has drawn up a report on the conversion of the remaining gas lighting to electricity. The supply, erection and servicing of 10,079 electric lamps is estimated to cost £352,760.

PRESTON (Yorks) Parish Council is seeking loan sanction of £2,000 for converting the village's street lighting from gas to electricity.

TYNEMOUTH Town Council is to improve the street lighting at Billy Mill Avenue and in Regent Terrace at a cost of £3,170.

The most recent addition to the range of Revo street lighting columns, which has just been passed by the Council of Industrial Design, is the "Epic," a slender tapering column in concrete. It is a rectangle with chamfered corners, and is designed to carry single arm brackets of 2ft 6in, 3ft 6in, 5ft and 6ft projection. Double arm brackets are also available.



Revo "Epic" concrete column with single arm bracket carrying a C.13723 lantern for sodium lamps

Profit from Trolley-Buses

The 1953–54 accounts of the Wolverhampton Municipal Transport Department (general manager, Mr. R. H. Addlesee) show that the trolley-buses earned a total revenue of £728,712 and there was a gross profit of £159,500. Revenue from motor-buses amounted to £485,486, with a gross profit of £9,071, making the aggregate for the combined services £168,571. After meeting loan charges, etc., there was a net surplus of £26,277. The total vehicle mileage of the trolley-buses was 5·7 million and of the motor-buses 4·7 million, passengers carried numbering 75·7 million and 37·1 million, respectively. The average ordinary fares charged per mile were 1·269d (trolley-buses) and 1·350d (motor-buses). Electricity consumption for traction amounted to 13·6 million kWh.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Australia.—25th October. Electricity Commission of New South Wales, Sydney. Relays and associated equipment for 132 kV and 33 kV busbar protection. (E.S.B. 22757/54. Ten/10830.)*

Belfast.—Fire Brigade. 13th October. Renewal of electrical installation in Albertbridge fire station. Specifications, etc., from the Fire Brigade Headquarters, Chichester Street.

18th October. Northern Ireland Housing Trust. Electrical installations in 255 houses at Rathcoole, Whitehouse, and 61 dwellings at Donaghmore Road, Dungannon. Specifications, etc., from the offices of the Trust, 12, Hope Street.

Brandon and Byshottles.—U.D.C. Electrical apparatus for 49 houses to be erected at Ushaw Moor. F. Hedley, architect and surveyor, Council Offices, Langley Moor, co. Durham.

Dagenham.—20th October. Corporation. Street lighting installation. (See this issue.)

Denmark.—6th October. Forsvarets Telegrafforvallning, Copenhagen. Standby generator (N.A.T.O. Infrastructure Contract.) (E.S.B. 19477/54. Ten/10889.)*

Donegal.—29th October. County Council. Electrical installation in new district hospital, Carndonagh. Specifications, etc., from J. C. Costello, consulting engineer, 21, Leeson Park, Dublin.

Ellesmere Port.—11th October. U.D.C. Sodium lighting Chester-Birkenhead road. (See this issue.)

Esher.—11th October. U.D.C. Renewals and repairs to internal electrical installation in the main block of the Council offices. Forms from C. G. Alderton, surveyor, Council Offices, High Street.

Formosa.—19th October. Group fault indicator and annunciator system for the Taiwan Power Co., Taipei (E.S.B. 22546/54. Ten/10796.)* Transformers. (E.S.B. 22547/54. Ten/10804.)*

India.—15th October. Government Electricity Department, Madras. H.v. insulators. (E.S.B. 22906/54. Ten/10864.)* 11th October. Meters. (E.S.B. 22907/54. Ten/10853.)*

London.—29th October. India Store Department. Diesel electric generating sets, transformer cubicles, etc. (See this issue.)

Mitcham.—2nd October. Corporation. Street lighting equipment. (See this issue.)

New Zealand.—4th November. Cadmium-copper tapes and copper binding wire. (E.S.B. 22527/54. Ten/10788.)* 11th November. Junction boxes. (E.S.B. 22528/54. Ten/10792.)* 16th November. Switchboard cable and wire. (E.S.B. 22548/54. Ten/10790.)* 23rd November. Voice frequency carrier telegraph terminals. (E.S.B. 22549/54. Ten/10786.)* Post and Telegraph Department, Wellington.

25th January. Over 30,000 kVA transformer bank and spare unit for the State Hydro-Electric Department, Wellington. (E.S.B. 22550/54. Ten/10791.)*

Orpington.—11th October. U.D.C. Installation of Group A fluorescent street lighting, at High street. Tender forms from the surveyor, 46, Barkhart Road.

Pakistan.—26th October. Department of Supply and Development. Two 5,000 kVA transformers. (E.S.B. 22982/54. (Ten/10873.)*

Persia.—16th October. Foreign Operations Administration, Tehran. Diesel generating plant (80-100 kVA). (E.S.B. 22765/54. Ten/10840.)*

Rochester.—23rd October. City Council. Three 10in vertically driven centrifugal pumps, with motors, automatic starters, switchgear, etc., for main drainage scheme. Forms from the city surveyor, 66, Maidstone Road.

Romford.—11th October. Corporation. Electrical installations in 24 flats. (See this issue.)

Southern Rhodesia.—20th October. Electricity Supply Commission, Salisbury. Lightning arrestors. (E.S.B. 22968/54. Ten/10881.)*

Todmorden.—11th October. Corporation. Cable and steel conduit. (See this issue.)

Tunbridge Wells.—19th October. Corporation. Street lighting installation, Eridge Road. (See this issue.)

United States.—7th October. Bureau of Reclamation, Denver, Colorado. Two 34·5 kV, 600 A, power circuit breakers. (E.S.B. 22647/54. Ten/10834.)*

ORDERS PLACED

Hastings.—Water and Fire Brigade Committee. Recommended. Four electrically driven pumps for the Rother pumping station (£3,435).—Worthington-Simpson. Switchgear for Rother station (£3,539).—Igranic.

Keswick.—U.D.C. Supply and erection of 37 concrete lighting columns fitted with fluorescent lanterns (£2,956).—Revo.

Lancashire.—Education Committee. Recommended. Re-wiring work at County Secondary School, Crosby (£1,913).—Broughton & Irlam Electrical Engineering Co.

Royston.—U.D.C. Street lighting, trunk road, A10.—Cohen Bros. (Electrical) Ltd.

Warrington.—R.D.C. 100 "S.O. Fifty" lanterns, lamps and gear (£2,081).—Metropolitan-Vickers Electrical Co.

WORK IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Accrington.—Central omnibus station, Peel Street; J. W. Buick, borough surveyor.

Ashford (Kent).—Houses (65), Beaver Green Farm site, for U.D.C.; surveyor, 5, North Street.

Barnsley.—Reconstruction of Gaumont Theatre; Circuits Management Association, Ltd., 5, Bainbridge Street, London, W.C.1.

Basingstoke.—Houses (71), at Sherfield; J. A. Manser & Son, builders, Longbridge, Sherfield-on-Loddon.

Berwick.—Proposed factory; Lamb and Edge, estate agents, 36, Blackett Street, Newcastle-on-Tyne.

Birmingham.—Centre for further education, Harborne Hill; Hoare, Lea & Partners, heating and electrical consultants, 23, St. James Road.

Seventeen shops, eighteen flats and offices, Heathway, Shard End; city architect.

Bollington (Ches.).—Factory at Jackson Lane for Eric Britton, Ltd.; Moston Brick & Building Co., Ltd., Kenyon Lane, Collyhurst, Manchester.

Bracknell.—Dwellings (438), for Development Corporation; Geo. Wimpey & Co., Ltd., builders, 23, Hammersmith Grove, London, W.6.

Bristol.—Offices, King Street; J. R. Phillips & Co., Ltd., 18/19, Nelson Street.

Rebuilding Redland Park Congregational Church; J. Perkins & Son, Ltd., builders, St. Mark's Road.

Showrooms and offices, Queen's Road; Alec F. French & Partners, architects, Halifax House, St. Augustine's Parade.

Cardiff.—Industrial research station, Llanishen Estate; Richard Thomas & Baldwins, Ltd., Ebbw Vale, Mon.

Cheadle (Staffs).—Stage 1 of new factory for Associated Portland Cement Manufacturers; Sir A. McAlpine & Sons, Hooton, Wirral, Cheshire.

Cheltenham.—Factory in Clare Street; Cotswold Metalcrafts, metal workers, Clare Street Works, Bath Road.

Chester-le-Street.—Factory additions for D. and M. Cash, Ltd.; J. G. Cowe and Son, architects, Bridge End Chambers.

Crawley.—Factory; T. G. Dowdall & Sons, Ltd., 16, Jowett Street, London, S.E.5.

Crewe.—Crematorium (£28,000); borough engineer.

Darlington.—Residential hotel at the junction of Coniscliffe Road and Carmel Road; Edgar Lawson, Ltd., builders, Alliance Works, Albert Hill.

Eastbourne.—Factory, Brampton Road; Wm. F. Blay, Ltd., builders, Spital Street, Dartford.

Gateshead.—Factory additions (14,000 sq. ft.) for Perga Cartons, Ltd., Team Valley Trading Estate; R. W. Gregory and Partners, electrical consultants, Pilgrim House, Newcastle-on-Tyne.

Factory additions, Team Valley Estate for James White, Ltd., shopfitters; E. M. Lawson, architect, Barras Buildings, Barras Bridge, Newcastle-on-Tyne.

Factory additions for Hunters, Ltd., bakers; G. H. Gray, architect, Camden Street, North Shields.

Haslingden.—Factory, Broadway; Durie & Miller, Ltd., Farholme Mills, Stacksteads, Bacup.

Heywood.—Dwellings (132), Hardfield estate; borough architect.

Higham Ferrers.—Houses (70), in the Simpson Avenue area; town clerk, Town Hall, Higham Ferrers, Northants.

Honiton.—Houses (49), Jerrards estate; Anthony Lamb, architect, 2, Prospect Place, Ottery St. Mary, Devon.

Huntingdon.—Factory; Silent Channel Co., Ltd., Ferrars Road.

Hyde.—Block of offices and stores in Church Street; E. C. Byle and Co., Ltd., paint merchants, 8, Church Street.

Kenilworth.—Flats and houses (108), Dale House Lane, etc., sites; U.D.C., surveyor, Council House.

Liverpool.—Large new office block at James Street for Scottish Life Assurance Co., Ltd.; Tysons (Contractors), Ltd., Dryden St.

London.—Welsh Presbyterian Church, Holborn Viaduct; Albert J. Thomas, architect, 31a, Sloane Street, S.W.1.

Northampton.—Out-patients' department for General Hospital; Sir John Brown, A. E. Henson & Partners, architects, 30, Billing Rd.

Peterborough.—Police station in Bridge Street (£60,000); city engineer.

Petworth.—Dwellings (36), Loxwood housing area; housing architect, Council Offices.

Potters Bar.—Dwellings (400), Great North Road area; borough engineer, Town Hall, Edmonton, N.9.

Scunthorpe.—Flats (57), Lincoln Gardens; Bernard Pumfrey, Ltd., Wintern Works, Lee Road, Gainsborough.

Willesden.—Extensions; McVitie & Price, Ltd., Edinburgh Biscuit Works, London, N.W.10.

* Specifications may be inspected at the Export Services Branch, Board of Trade, Lacon House, Theobald's Road, London, W.C.1 (Chancery 4411; extension 769).

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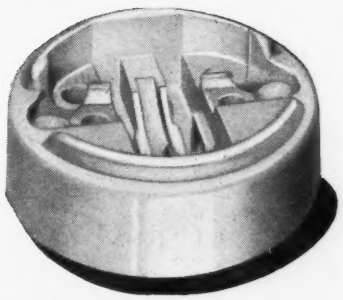

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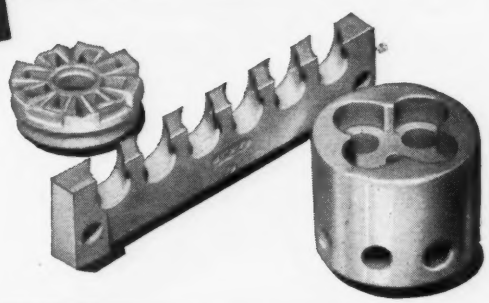

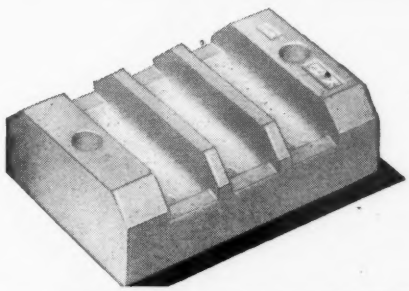

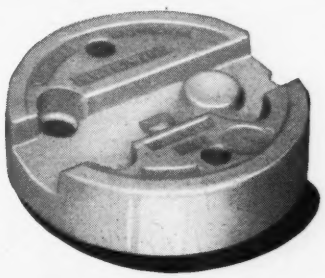

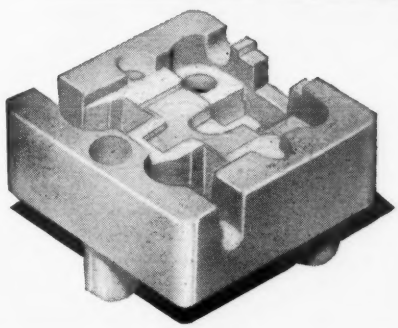

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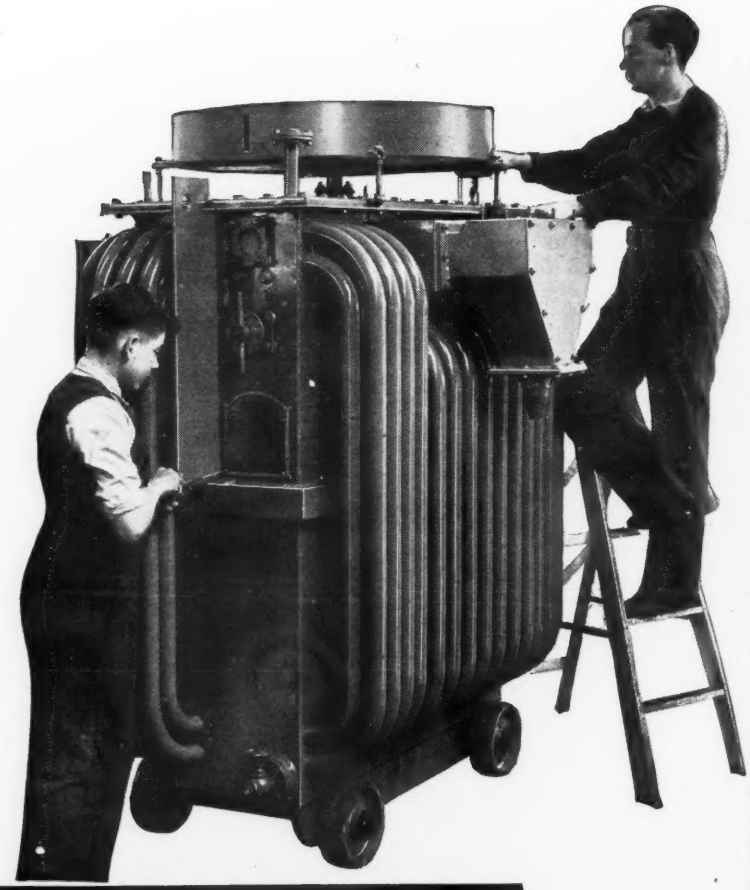

This is a hermetically sealed 500 kVA 3 phase outdoor type transformer.

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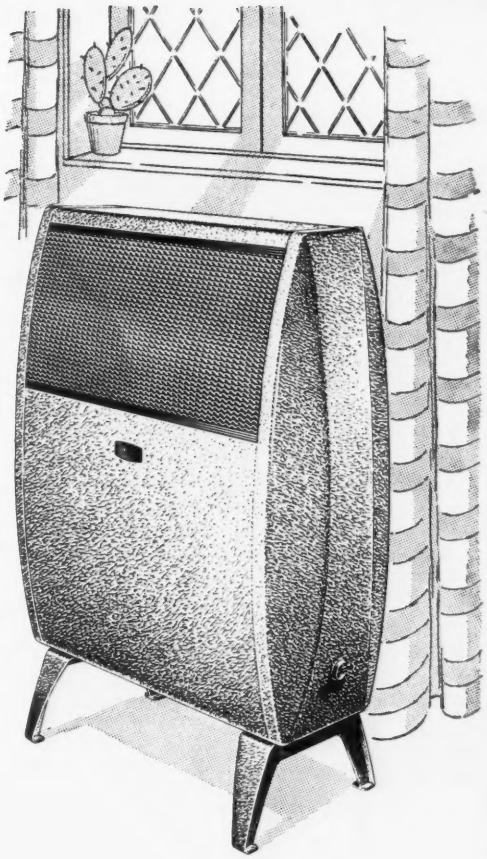
If you were a woman –



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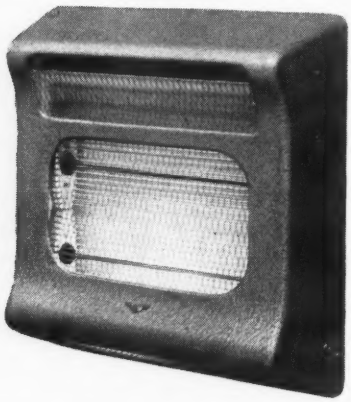

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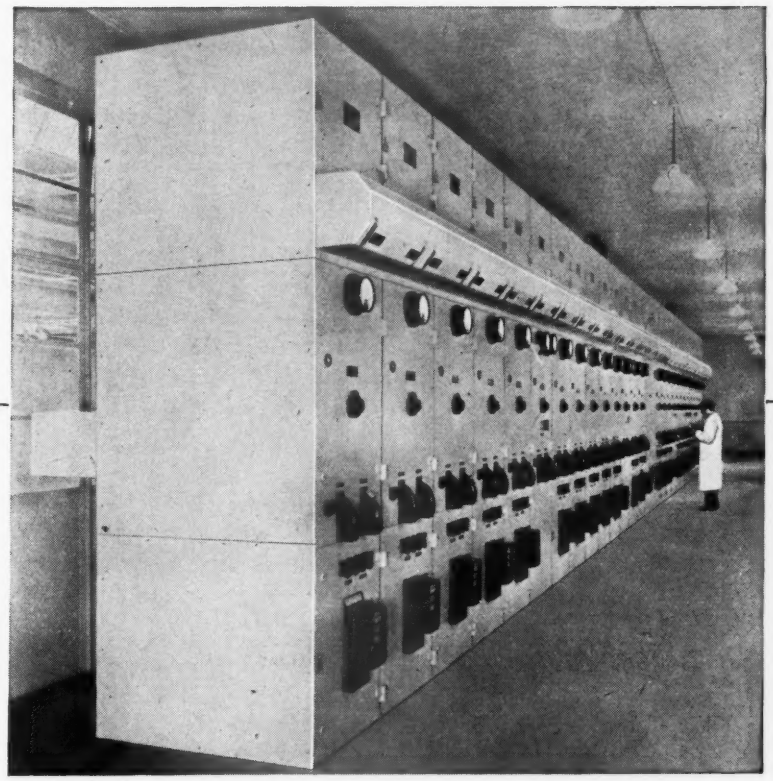

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The photograph of the installation is shown by courtesy of Leyland Motors Limited.

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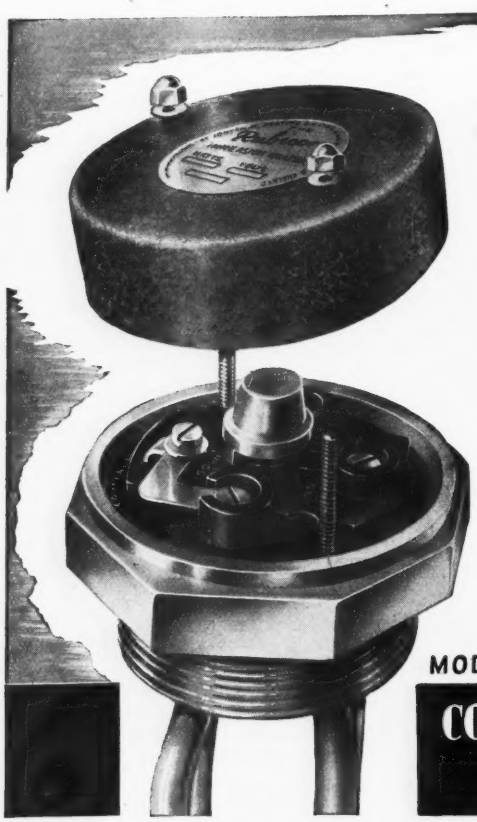

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3½" × 2"	2½" × 1½"	2" × 1⅛"
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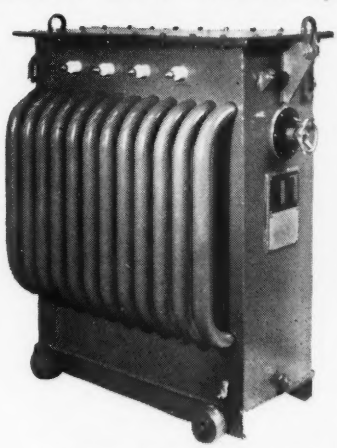

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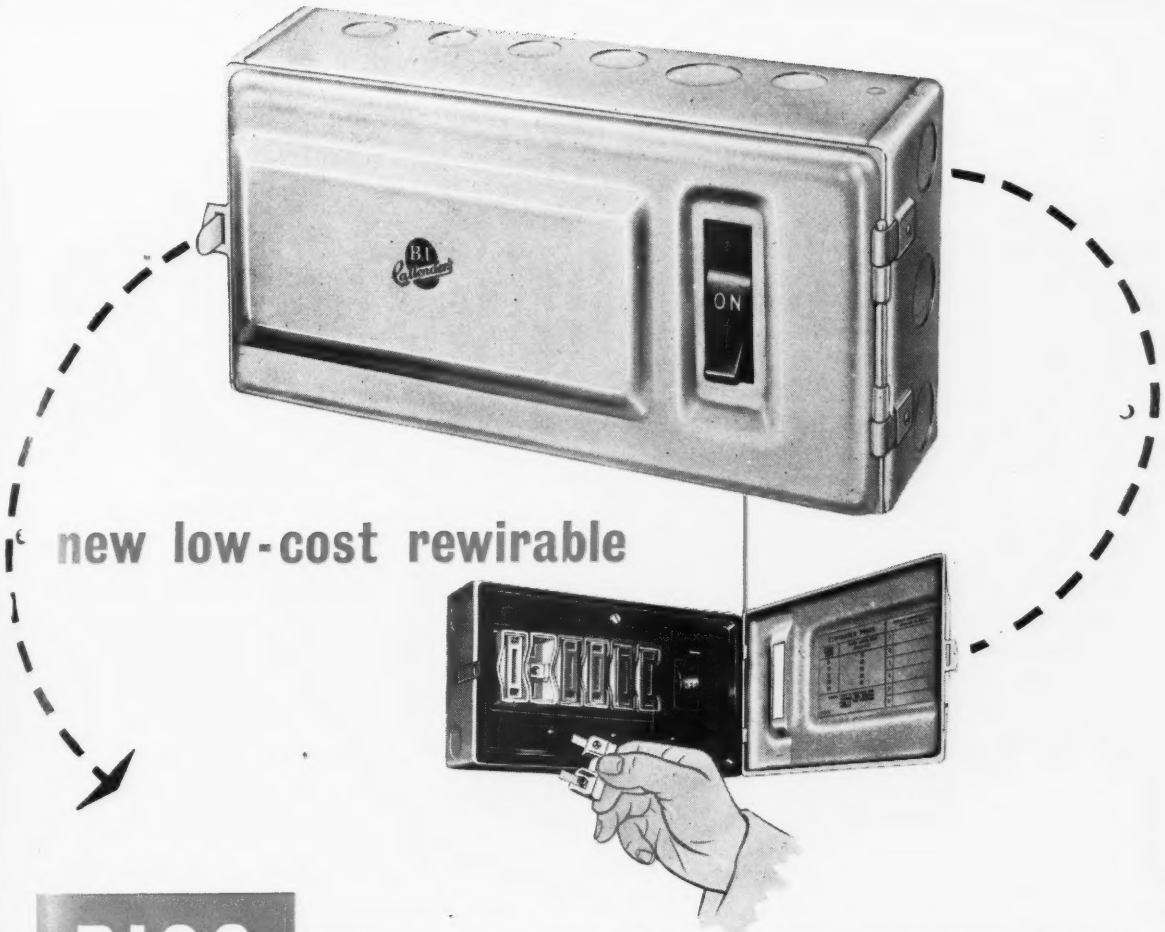

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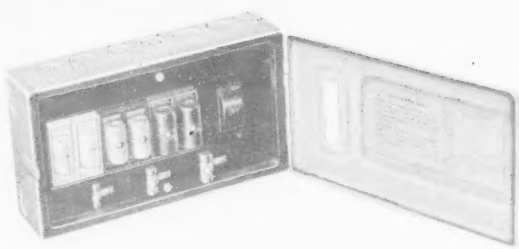

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- Six fuse-ways, which can be arranged in any combination of 5, 15 and 30 amps.
- Popular rewirable fuses, involving minimum replacement costs to consumer. Rating 250 AC1 in accordance with B.S.88.
- Easy wiring in any installation through knockouts in sides, ends and back. Suitable for conduit or non-metal-sheathed cables.
- Handsome cream enamelled case of rust-proofed heavy-gauge steel.
- Double-pole 60-amp. micro-gap switch, adequate for all domestic installations. Full compliance with B.S.1454 as to shielding, provision for earthing and bonding, etc.

BRITISH INSULATED CALLENDER'S CABLES LIMITED

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LONDON, W.C.1. MUSEUM 1600

F4

The Shortening Days

and the BALANCE OF POWER

SHORT WINTER days, long winter nights, emphasise the importance of street lighting—for safety, for convenience and for peace and order. Street lighting is in the news, and all over Britain there are plans to put up more lights, better lights—*electric* lights.

The new street lamps are efficient, economical, helpful to motorists, pedestrians, and all who use the streets. But as street lighting plans develop, more electricity will be used. This is good news. Why?

It's a matter of balance. As more electricity is used in more ways, the different loads—occurring, in the main, at different times of the day—keep the generating plant more fully employed. And continuous full output from the power stations helps to reduce the cost of electricity.

SIX YEARS' PROGRESS

40 NEW POWER STATIONS

50% MORE POWER

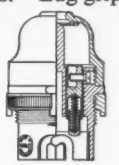
Ashley Regd. B.C. LAMPHOLDERS

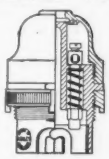
Eight types of "Ashley" B.C. Lampholders, listed in one hundred and thirty-two variations. All are well designed, precision made from the best materials, and quality controlled. Each one is "Ashley" branded, guaranteed, and reasonably priced.

FEATURES. Moulded, or with porcelain interiors. Brown or white. Brass liners. Spring or solid plungers, with non-rust springs. Easily wired terminals. Lug grip shade carrier rings with brown holders. White holders have short shields. Home Office pattern ventilated shields. Excellent finish. Complying B.S. 52.

SPRING PLUNGERS

Terminals stationary during lamp insertion or removal.





SOLID PLUNGERS

Terminals move during lamp insertion or removal.

CORD GRIP

Spring or solid plungers. Has effective cord grip. One type lamplocking, key operated.

CORD GRIP "DREADNOUGHT"

Heavyweight, with porcelain interior, solid plungers, non-rotating cap, and effective cord grip.

THREADED

Spring or solid plungers. Choice of six threads:—
⅜", ½", ⅝" brass,
½", ⅝", ¾" conduit.

T.R.S. GLAND

Spring or solid plungers. With screwed bush and grommet, to grip 14/.0076 round twin T.R.S.

BATTEN

Spring plungers. Easily wired body removes from base rear. 2" fixing centres. Available with "loop-in" third terminal.

SIGN

Spring or solid plungers. With shade carrier ring. Without cap. For clamping through a metal or other plate.

ANGLED BATTEN

Angled 45°. Spring plungers. Easily wired body removes from base rear. 2" fixing centres. Available with "loop-in" third terminal.

FESTOON STRIPLIGHT

Spring plungers. Black. Clamps on and connects to flat twin T.R.S. Weatherproofing sleeve and grommet available.

"Ashley" Home Office pattern shield

LIGHT UP WITH Ashley Regd.

GUARANTEED ELECTRICAL ACCESSORIES

REGD.

ASHLEY ACCESSORIES LTD

ULVERSTON, LANCASHIRE

Phone: Ulverston 3333 Grams: Ashley, Ulverston

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covers all insulation

"Formapex" is a laminated plastic of outstanding adaptability. It is made in two basic forms :— paper base for electrical insulations, and fabric base for bearings, gears, pinions and many other mechanical purposes.

"Formapex" electrical insulation has exceptional machining and mechanical qualities and is available in flat sheets and panels, round and rectangular tubes, machined parts, punchings, etc. It is highly resistant to moisture, dilute acids and organic liquids.

Full information and samples will be sent gladly on request.

IOCO LIMITED
ANNIESLAND, GLASGOW, W.3

FAIR PLAY

SWITCH BLOCKS
built of **KILN DRIED** *timber*
STAY FLAT
AND CORRECT SHAPE

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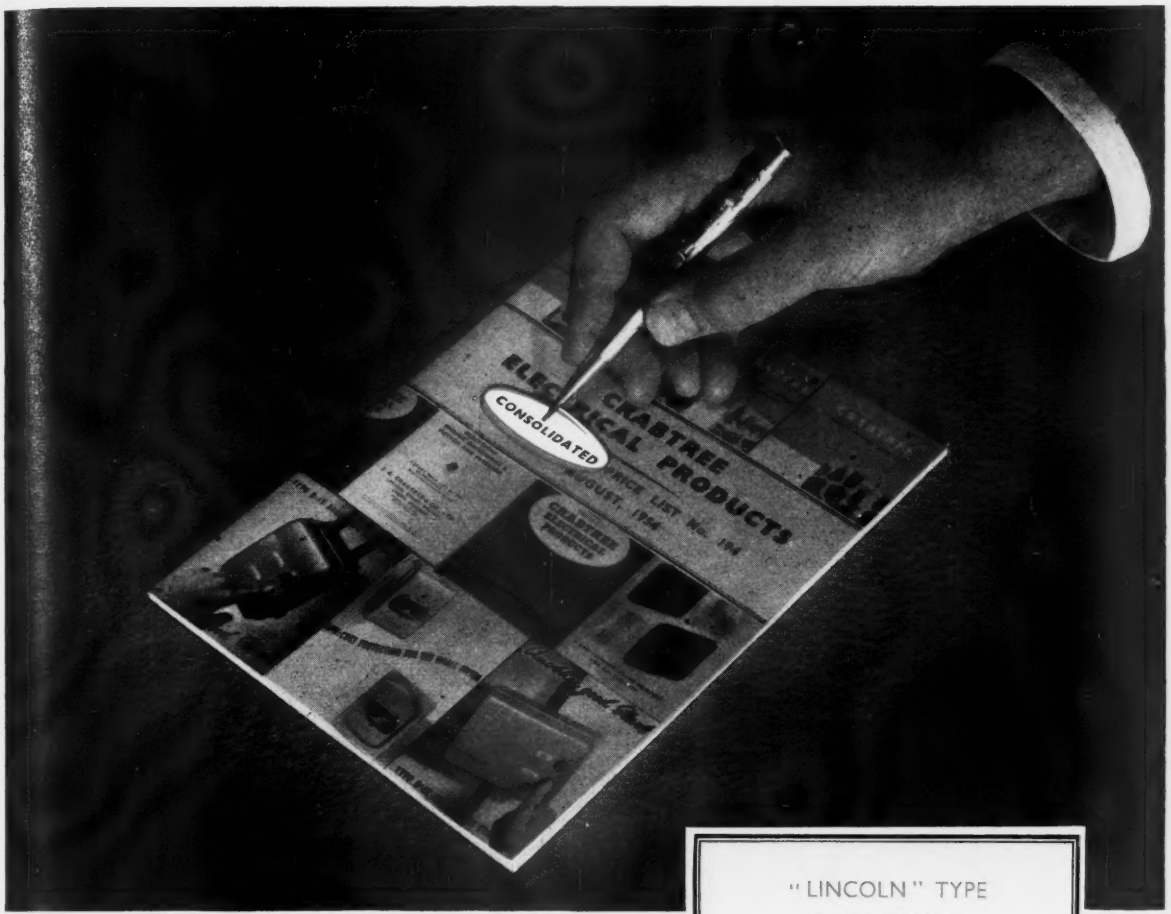
WOOTTON & CO. LTD.

ALMA WORKS, PONDERS END
MIDDLESEX
TELEPHONE: HOWARD 1858

FOR YOUR CONVENIENCE— A NEW TIME SAVING PRICE LIST



New prices for Crabtree products are contained in Price List No. 194, prices being in list number order and including all advances. For your further convenience, extras are shown following the list numbers to which they refer. In this time-saving list, some prices have been revised and adjusted; others remain unchanged; and, for "Lincoln" Type AC flush switch units, prices have been reduced.

"LINCOLN" TYPE AC SWITCHES

Because of manufacturing economies resulting from greatly increased demand, prices of "Lincoln" Type AC flush switch units have been reduced. So that units may be used with widely varying plaster depths, three sizes of unit-fixing screw are available for metal and wood boxes. To simplify stocking, switches and screws are listed separately.

CRABTREE

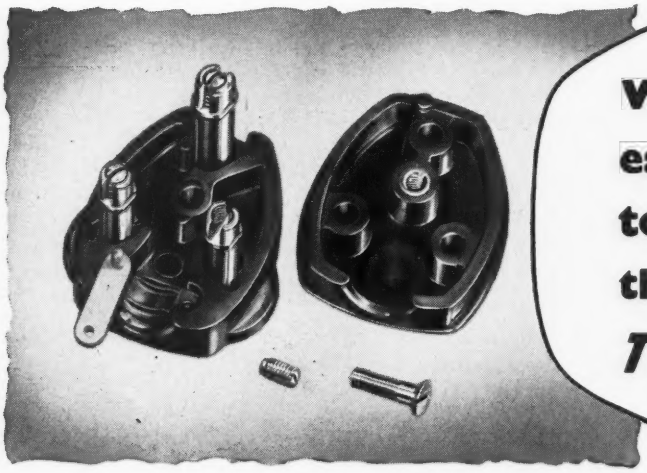
WIRING ACCESSORIES • SWITCHGEAR • MOTOR STARTERS

"Crabtree" (Registered)

C697/248 Advt. of J. A. Crabtree & Co. Ltd., Lincoln Works, Walsall, Staffs.

Complies with
B.S. 546
and I.E.E.
Wiring Regulations

The TEMCO 3-pin Top Entry Switch Socket is now fitted with a flared top to prevent overhang and so complies fully with B.S.546 and I.E.E. Wiring Regulation 1312 (C) 12th Edition. It can be used with confidence when low cost is the primary consideration.



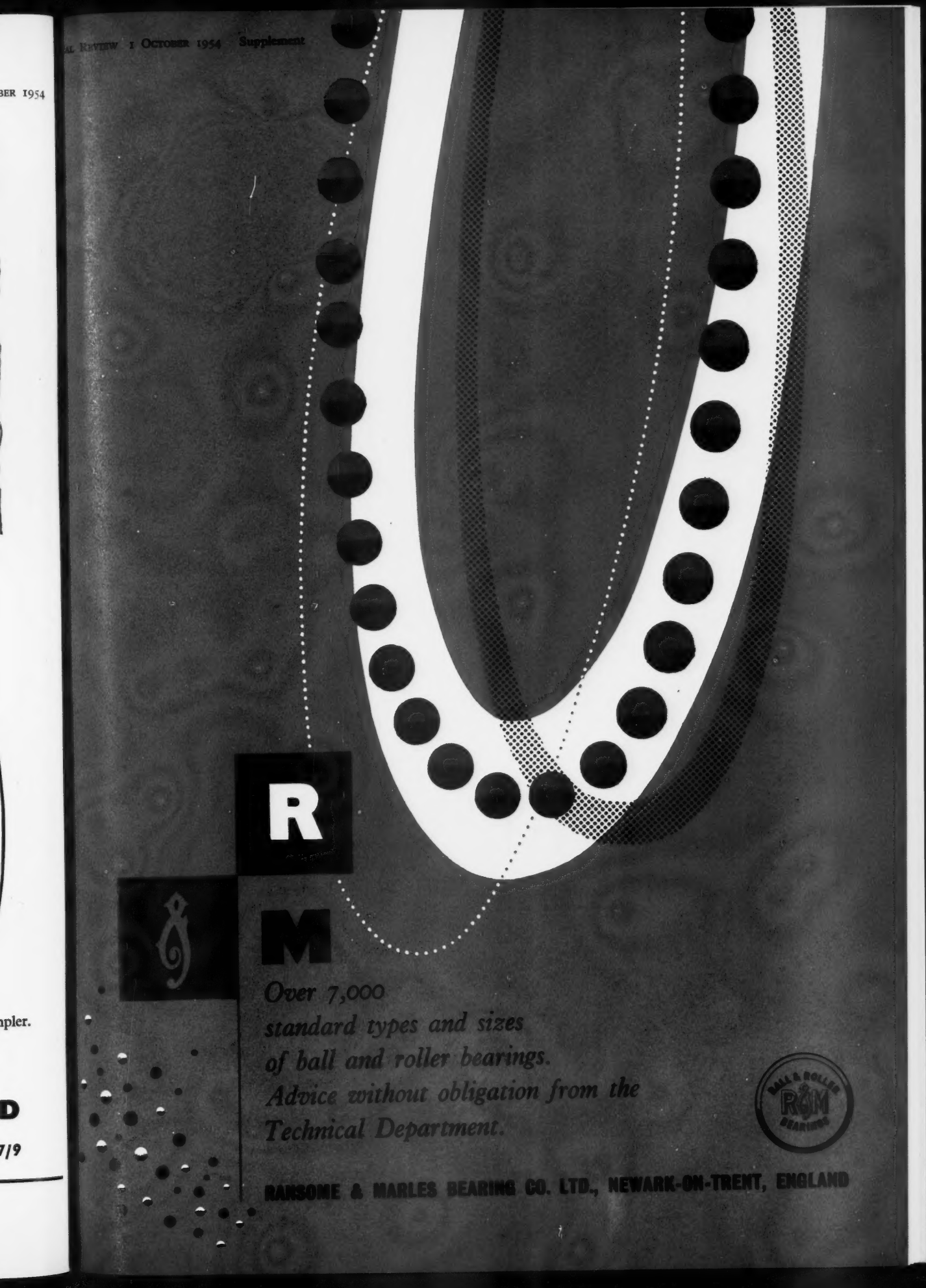
What could be easier to wire than the new *TEMCO* plug?

The terminals are similar to those used on TEMCO junction boxes. Wiring could not be simpler.

Please write for our fully illustrated catalogue.

T. M. C.—HARWELL (SALES) LTD

37 UPPER BERKELEY STREET, LONDON, W1 ***Telephone: PADdington 1867/9***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M
Over 7,000
standard types and sizes
of ball and roller bearings.
Advice without obligation from the
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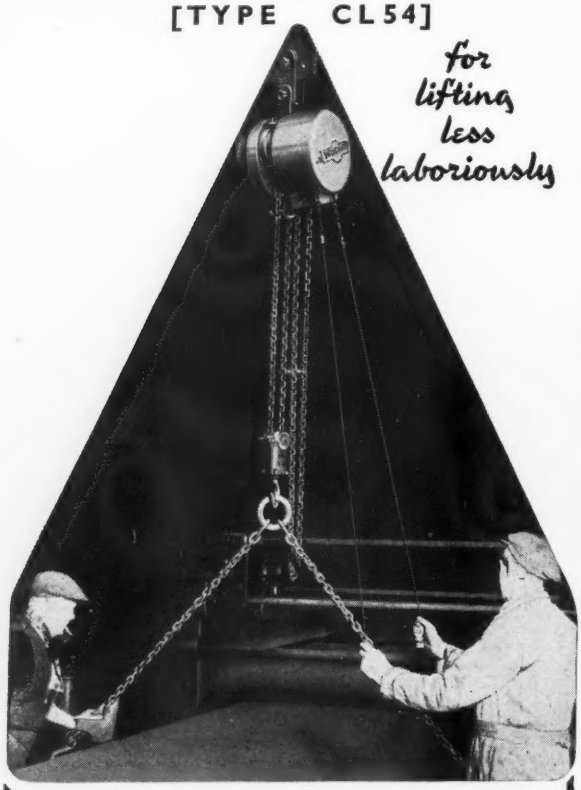
BEARINGS
RANSOME & MARLES BEARING CO. LTD., NEWARK-ON-TRENT, ENGLAND

Vaughan Powerlift

HOIST BLOCKS
[TYPE CL54]

for lifting less laboriously



½ TON £79 | ¾ TON £86 | 1 TON £89 | 1½ TON £98

FOUR BASIC SIZES

Prices shown are for 3-phase A.C. with 10ft. hook to hook lift.

DISPATCH EX-STOCK

Prices of Travelling Trolleys and other details on application.

THE VAUGHAN CRANE CO. LTD.
MANCHESTER 12 : : : ENGLAND

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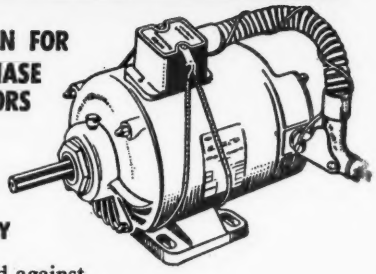
Makers of fine cranes for over seventy years.

Vaughan

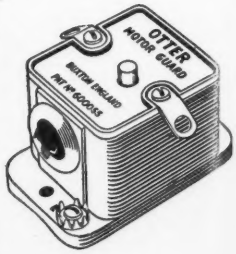
THE OTTER MOTORGUARD

PROTECTION FOR SINGLE PHASE A.C. MOTORS

⅛-1 H.P. CAPACITOR AND SPLIT PHASE ONLY



Otters guard against temperature and current overload, the starting current is carried by the thin Otter Bi-metal, which heats up more quickly than the motor windings. It cannot be fused. **List 21/7d.**



MANUAL RESET
Affords similar protection to the Auto, but upon "breaking" circuit will remain "off" until reset by pressing the Green knob. **List 31/7d.**

OTTER CONTROLS LTD
MARKET STREET, BUXTON **Tel.: Buxton 1619**

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Erected by The West Riding County Council. S. Maynard Lovell, Esq., O.B.E., T.D., County Engineer and Surveyor.

For conspicuity by night, use -
"SIGNLITE"
Illuminated Sign Assemblies

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GOWSHALL LIMITED
A GT COMPANY

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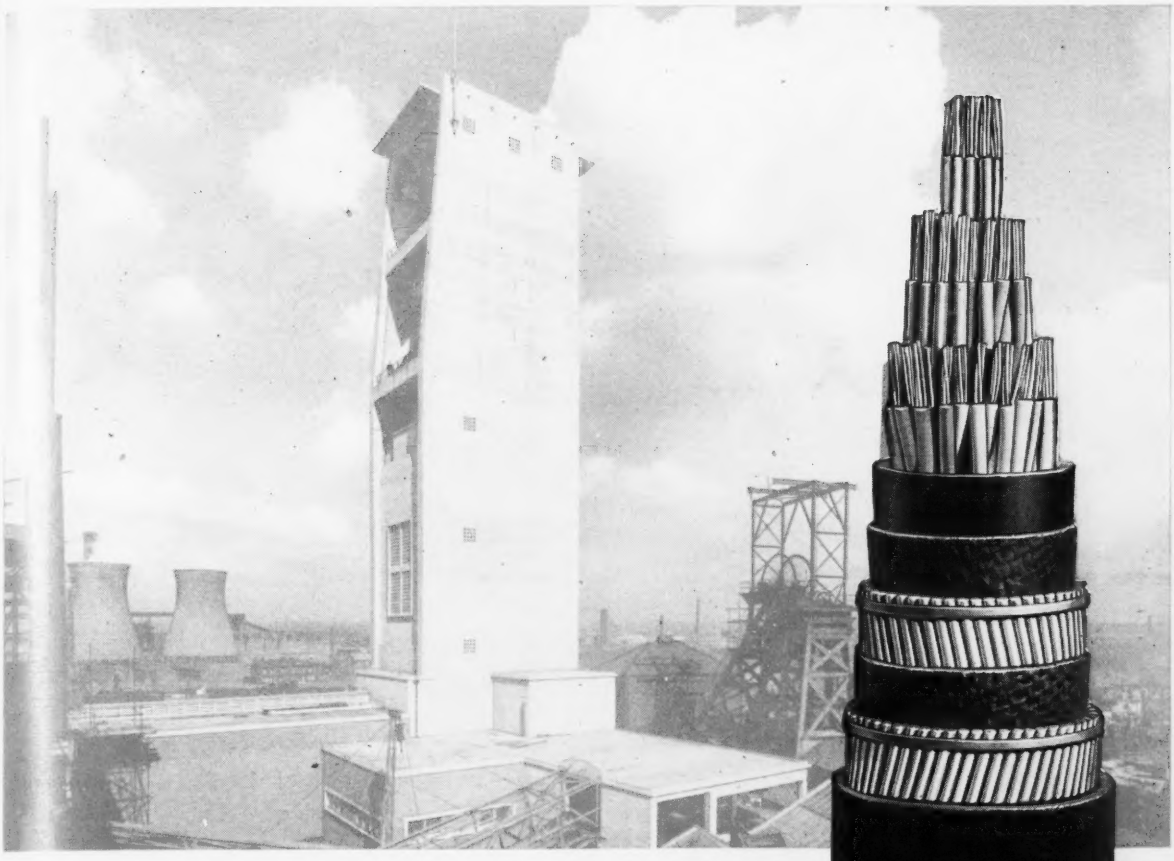
Lamb's Conduit Passage, Red Lion Sq., W.C.1 (Chancery 7042 & 7845)



VYBAK insulation for length*-and life

***This armoured signalling cable recently installed at the Bradford Colliery, Lancs. was made in a single length of 1,800 ft.** by the Mersey Cable Works Limited. The cable consists of 36 pairs of double-wires, each insulated with VYBAK covering in various colours and the whole enclosed in black VYBAK sheathing.

VYBAK Flexible Extrusion Compounds are tough and hard-wearing, with good resistance to fire, abrasion, weathering and most chemicals. A choice is available from a wide range of colours for electrical colour codes or decorative purposes.

Comprehensive data sheets for all grades are available on request.

BAKELITE LIMITED

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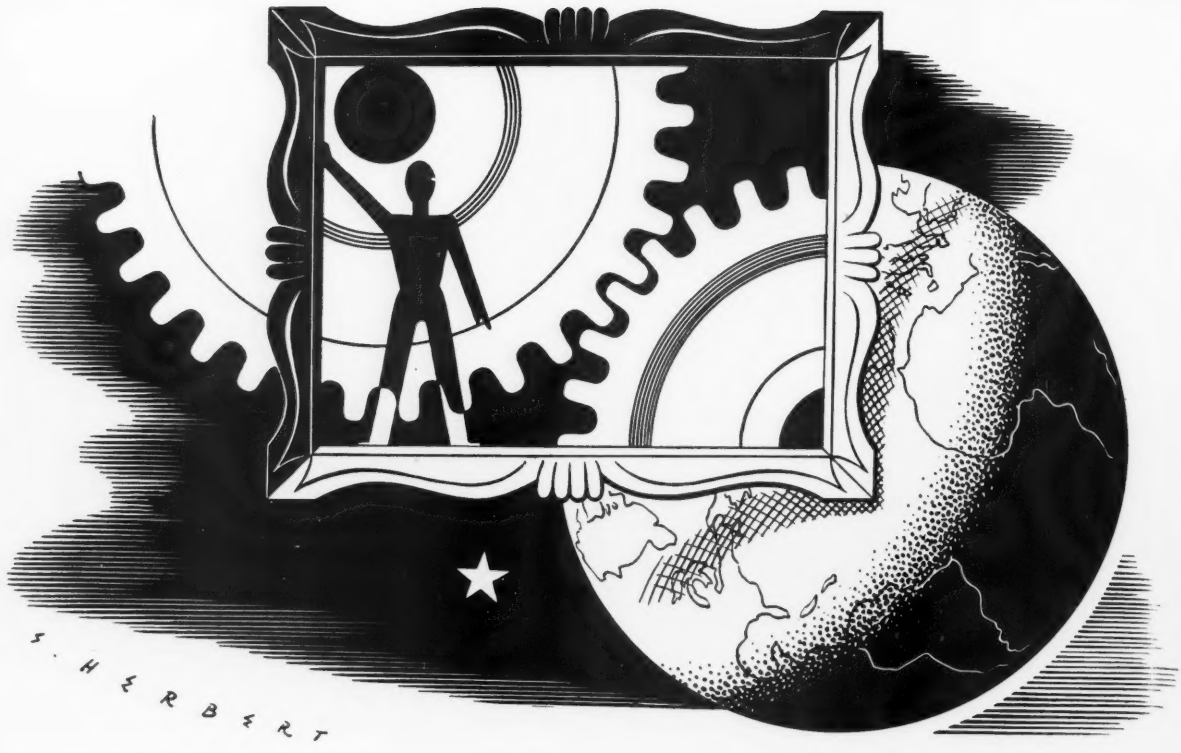
Vybak Products Include: Rigid and flexible PVC compounds for moulding and extrusion; calendered sheet; rigid and flexible pressed sheet—coloured, transparent or translucent; heavy grade industrial rigid sheet; Polymer and Copolymer resins.

VYBAK REGD.

Compounds

C4



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Here is a picture of interdependence with a real practical meaning. It is the modern interpretation of the picture Thos. W. Ward must have had in mind when he started his business 75 years ago—a visualisation of closely integrated manufacturing resources and service departments united in the common task of helping in the development of industry and commerce. As the scope of the Ward Group's activities has extended, so has its capacity for serving its many customers throughout the world.

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AND LONDON, GLASGOW, MANCHESTER, BIRMINGHAM, LIVERPOOL, BRISTOL, GRAYS, WISHAW, PRESTON, BARROW, BRITON FERRY MIDDLESBROUGH, MILFORD HAVEN, INVERKEITHING ANTWERP, PARIS, BOMBAY, CALCUTTA, SYDNEY, AND STOCKHOLM

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NOW! YOU KNOW YOU'RE GETTING ALL THE POWER YOU PAY FOR IN THIS NEW RANGE OF 10 LEAK PROOF BATTERIES

Now, for every type of lamp and torch everyone can be sure of getting "hours more power" from the new "RAY-O-VAC" range of 10 GUARANTEED batteries . . . each and every one cased-in-metal from top-to-toe to stay FRESH and full-powered longer. Only "RAY-O-VAC" Patented LEAKPROOF Brand Batteries carry the unique free-torch-for-a-damaged-one guarantee. For brighter, longer-lasting light, re-load with "RAY-O-VAC".

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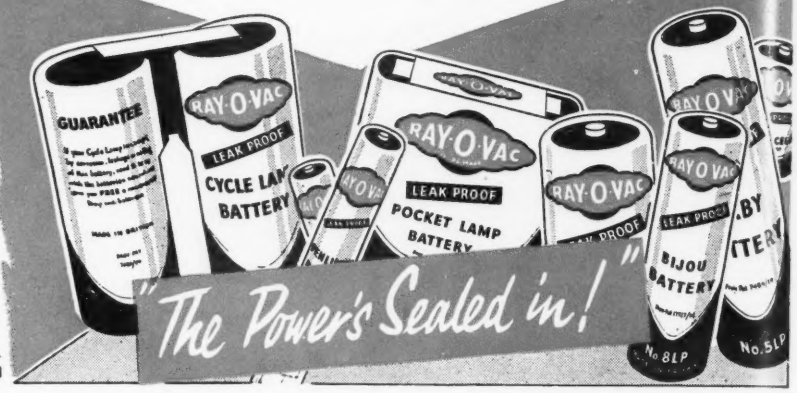
- 5 LP. Baby battery 1/2d
- 7 LP. Penlight cell 6d
- 8 LP. Bijou battery 11d
- 9 LP. Twin Cycle battery 2/0d
- 10 LP. Bijou cell 7d
- 14 LP. Penlight battery 1/0d
- 15 LP. Pocket lamp battery 1/6d



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Trade Terms from Wholesalers

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Mercury switches

THE MERCURY SWITCH MANUFACTURING COMPANY LIMITED are the largest specialised manufacturers of Mercury Switches in Great Britain. These are made to exceptionally high and uniform standards of quality.
Since its inception in 1932, this Company has concentrated solely on the production of Mercury Switches. It has thereby obtained the widest possible experience and expert knowledge of design, manufacture and application.

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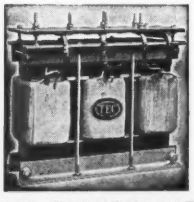
POWER & DISTRIBUTION TRANSFORMERS



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10 VA to 100 KVA Open, Enclosed, Oil Cooled, D.W. and Auto for INDUSTRIAL ENGINEERING, FURNACES, ELECTRONICS, PHASE CONVERSION, ETC.

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WASHERS LTD.

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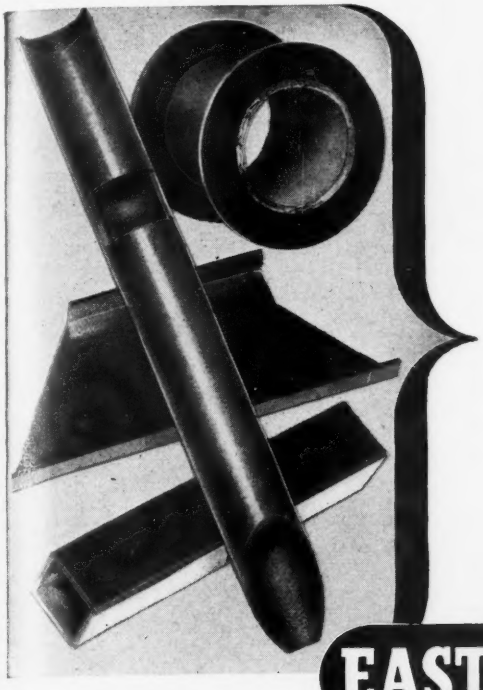

BAKELITE

Electrical Insulation

We manufacture and fabricate All Types of Laminated Bakelite Insulations.

Send us details of your requirements, and we shall be pleased to quote.

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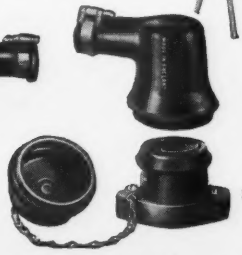
ESTD. 1912

SETTLE for NETTLE

The new **NETTLE** range of Weatherproof Rubber-clad Couplers, Sockets and Plugs is fully described in a new leaflet now available. A few typical items from this range are shown below. Write to-day for full details.

Ref. No. CP31 Watertight Rubber Cable Coupler 2 Amp. 3 Pin.

Ref. No. A133 Weatherproof 3-way Rubber Socket Adaptor 5 Amp. and 2 Amp.



Ref. No. P32 and SP32 Weatherproof Batten Socket and Plug Top Side Entry, 2 Amp. 3 Pin.

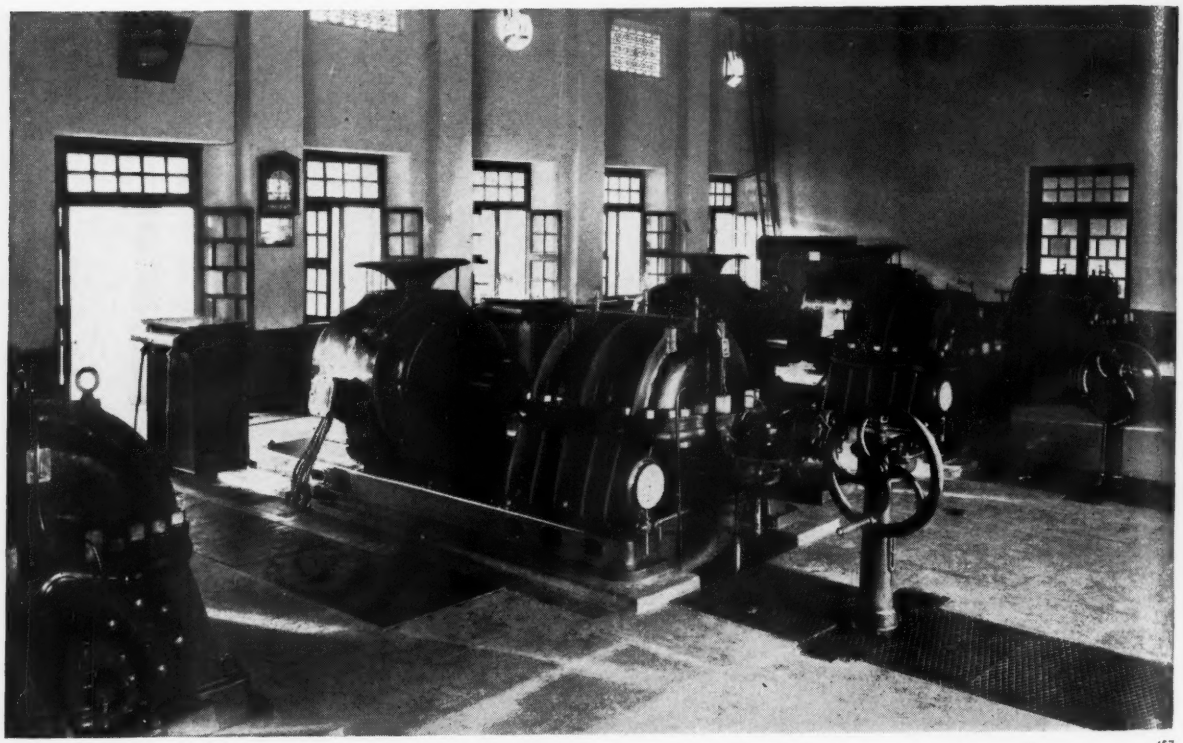
*Also available, the comprehensive Nettle Catalogue containing details of the full range of **NETTLE** Shockproof Electrical Accessories. You are invited to write for a copy.

NETTLE ACCESSORIES LTD.

HARPER ROAD · WYTHENSHAWE · MANCHESTER

MEMBER OF THE AERIALITE GROUP

1000 HP PUMPING SETS installed at Thippagondanahalli



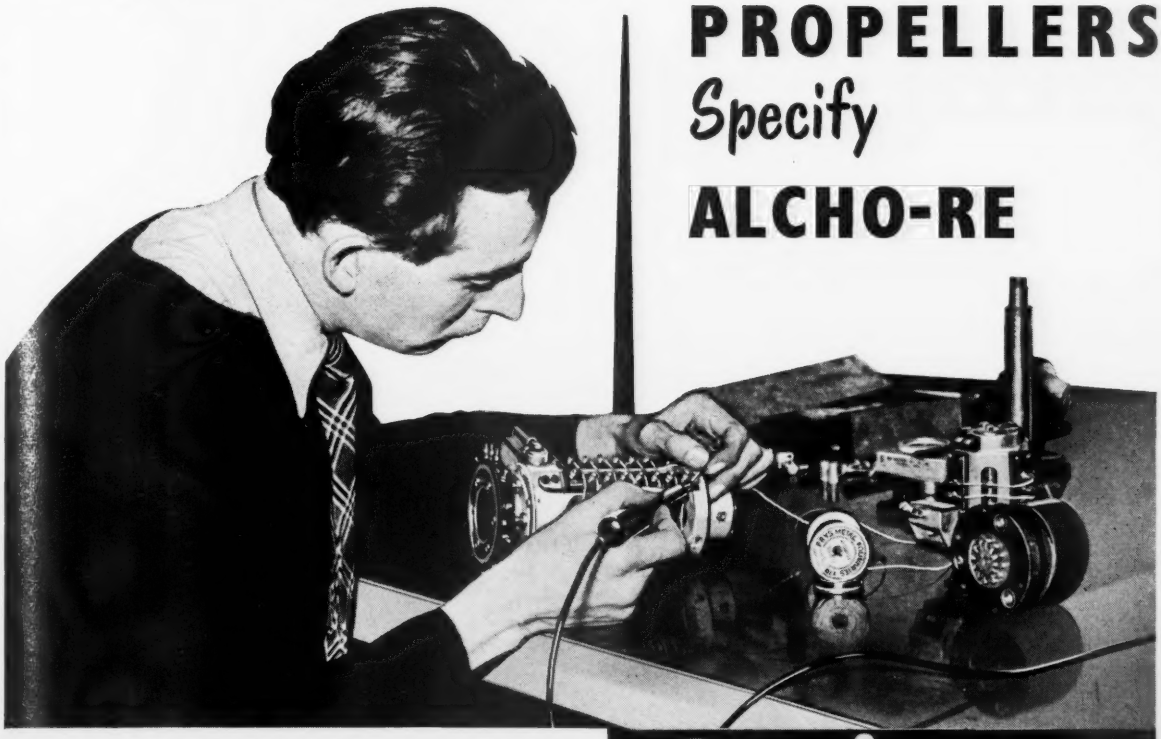
457

Mather & Platt Ltd. originally supplied three pumping sets for this installation for Bangalore Water Supply. Since then a repeat order of one set has been installed. The 3-stage split-casing pumps deliver 2,080 g.p.m. against 1,000 ft. head, driven at 1,485 r.p.m. by Mather & Platt 1,000 b.h.p. squirrel cage motors operating from 2,300 v. supply.

MATHER & PLATT LTD.

PARK WORKS
MANCHESTER 10

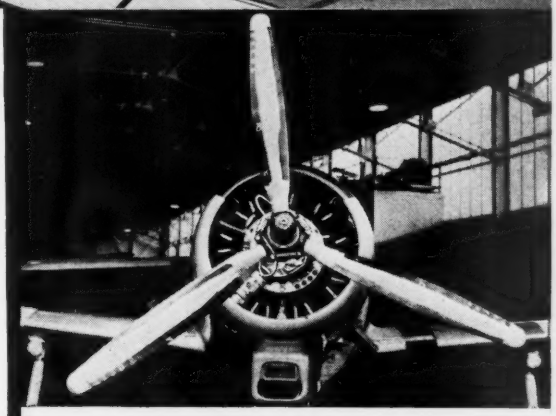
For perfect results... DE HAVILLAND PROPELLERS Specify ALCHO-RE



In their Vibration Test Department, de Havilland Propellers Ltd. specify FRY'S Alcho-Re Solders for electrical jointing. For fine work, where fast operation is essential, and where corrosive after effects must be eliminated, they employ FRY'S ALCHO-RE Solder Wire. This solder is one of a range developed especially for the electrical industry. Alcho-Re Fluxes conform to specification D.T.D. 599 and can be released by FRY'S own A.I.D. organization.

FOR EXPERT TECHNICAL ADVICE

No matter what your problem may be concerning soldering, FRY'S Research Department is available to assist you. Please send your enquiry by letter—or ring us. You'll find that we will be pleased to be of assistance.



In the first picture a connection is being made between slip rings and an electrical register unit devised by de Havilland Propellers Ltd. The small picture shows details of the propeller blades as they are wired-up to record stresses in the metal of the blades in flight.

Soldering simply means FRY'S

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Consistently yours

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THE TOOLS FOR EVERY JOB

With DORMER twist drills and reamers you can rely on that "extra" quality which gives a definite assurance of consistent and uniform performance.

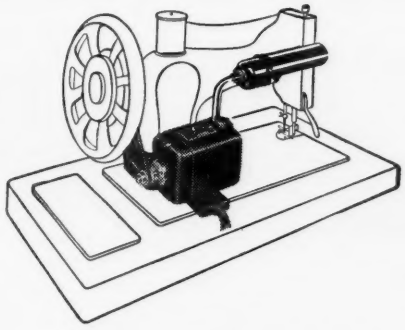
To ensure low tools costs combined with the highest possible output it will pay you . . . TO SWITCH TO "DORMER" . . . the tools for EVERY USE.

Photograph by courtesy of Hawker Aircraft Ltd., Kingston-on-Thames.

THE SHEFFIELD TWIST DRILL AND STEEL COMPANY LIMITED

SHEFFIELD **ENGLAND**

DORMER TOOLS ARE OBTAINABLE FROM YOUR USUAL ENGINEERS' MERCHANTS



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SEWING MACHINE MOTORS

Ideal Motor to transform hand or treadle Sewing Machine to Electric. British made 1/15 H.P. Motor. Running cost negligible. Complete with needle light and radio interference eliminator. Type ML/DB (Foot control) £6. 10. 3. Type ML/DBK (Knee control) £5.18. 3. Prices include Purchase Tax.

SEW-TRIC LIMITED
SEW-TRIC HOUSE, HONEYPOT LANE, STANMORE, MIDDLESEX

CHINA CONNECTORS

ONE, TWO AND THREE WAY
5 AMP.– 15 AMP.– 30 AMP.

FOR DETAILS, ASK FOR OUR CATALOGUE No. OHL/31/ER

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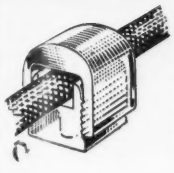
Metway Works
CANNING STREET
BRIGHTON, 7
Phone: Brighton 28366 Grams: 'Metway Phone Brighton'

EL-CLEAT makes your wiring neat



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Available in a colour range of transparent plastic material.
EL-CLEATS are used by leading manufacturers and contractors the world over.

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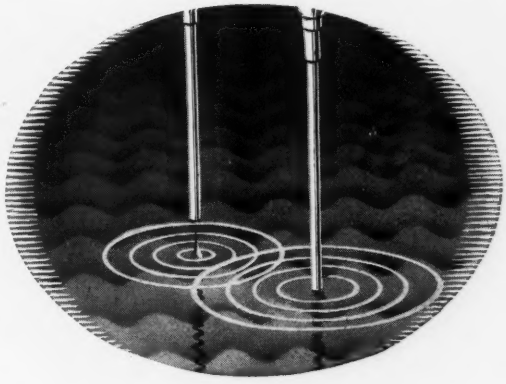
No overflow . .
No running dry



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ELCONTROL
AUTOMATIC LEVEL CONTROLS

The Elcontrol system provides an important all round "fail to safety" feature—it can be arranged to leave the controlled circuit either "open" or "closed" as desired, in the event of breakdown.

A variety of probe fittings for bore holes, open or pressurised vessels, sumps, etc., are available.

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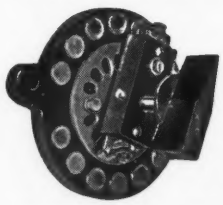

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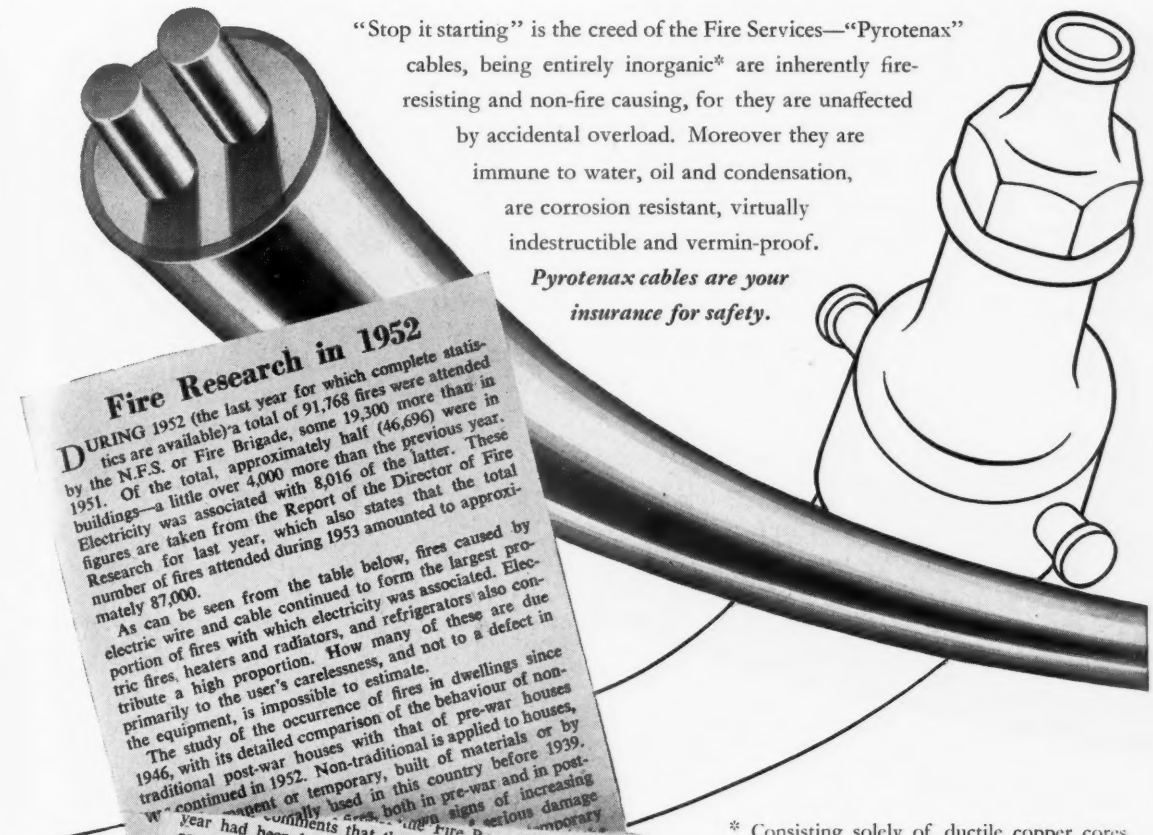

Fire Research in 1952

DURING 1952 (the last year for which complete statistics are available) a total of 91,768 fires were attended by the N.F.S. or Fire Brigade, some 19,300 more than in 1951. Of the total, approximately half (46,696) were in buildings—a little over 4,000 more than the previous year. Electricity was associated with 8,016 of the latter. These figures are taken from the Report of the Director of Fire Research for last year, which also states that the total number of fires attended during 1953 amounted to approximately 87,000.

As can be seen from the table below, fires caused by electric wire and cable continued to form the largest proportion of fires with which electricity was associated. Electric fires, heaters and radiators, and refrigerators also contribute a high proportion. How many of these are due primarily to the user's carelessness, and not to a defect in the equipment, is impossible to estimate.

The study of the occurrence of fires in dwellings since 1946, with its detailed comparison of the behaviour of non-traditional post-war houses with that of pre-war houses, continued in 1952. Non-traditional is applied to houses, w[illegible]ent or temporary, built of materials or by [illegible]lly used in this country before 1939, both in pre-war and in post-[illegible] signs of increasing [illegible] serious damage [illegible]

[illegible] Fire Research Board, the [illegible] comments that the programme for the coming year had been heavily pruned, energy having thus to be concentrated on some of the more pressing items. Even so, the effort will still be meagre in some directions, and in all sections of the laboratory the pressure to obtain information for particular purposes can only be at the expense of the basic research for which there is a real need.

Causes of Fire in Buildings

Supposed cause of fire	1948	1949	1950	1951	1952
Electric cooker	444	744	740	784	804
Fire, heater, etc. ...	893	900	1,092	1,180	1,148
Iron	356	436	372	364	372
Motor	280	180	264	310	324
Refrigerator... ...	789	1,108	1,132	1,020	1,124
Wire and cable ...	2,353	2,680	2,250	2,694	2,728
Wireless, television	365	444	450	548	584
Other apparatus ...	540	736	906	948	924
Static electricity ...	19	24	22	32	8
Total associated with electricity	6,039	7,252	7,228	7,880	8,016
Miscellaneous and unknown	4,755	5,600	5,798	5,830	6,824
Total fires in buildings	37,246	42,792	43,744	42,394	46,696

Extract from 'Electrical Times' dated July 1st, 1954

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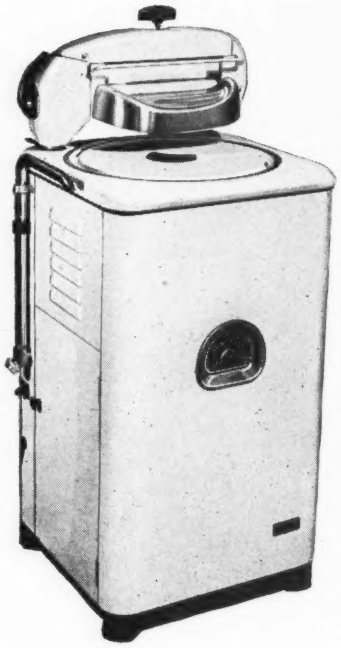

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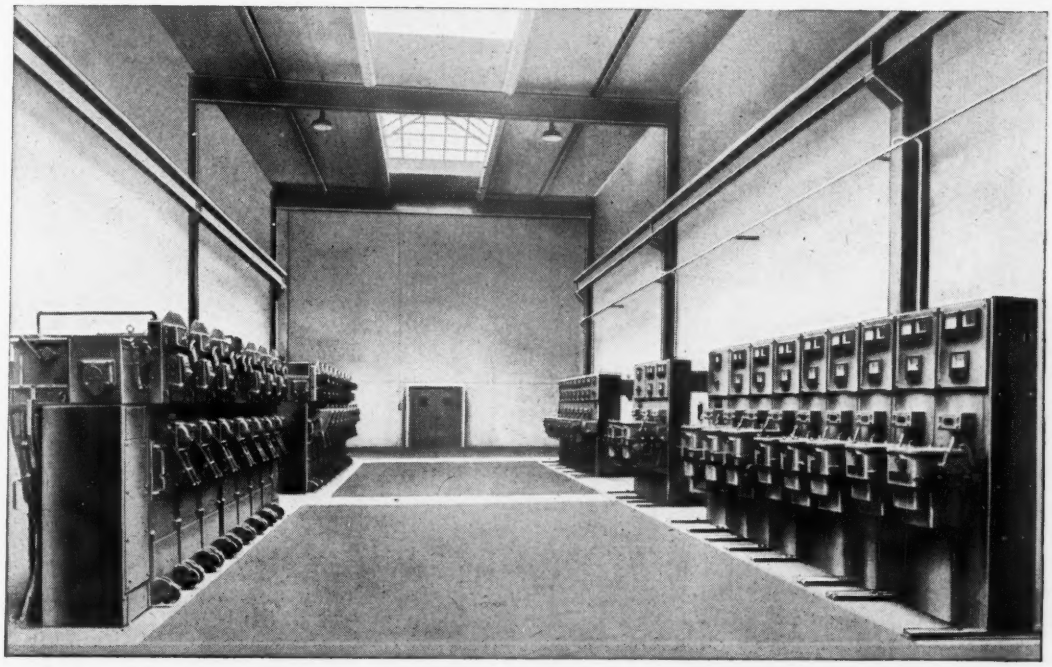

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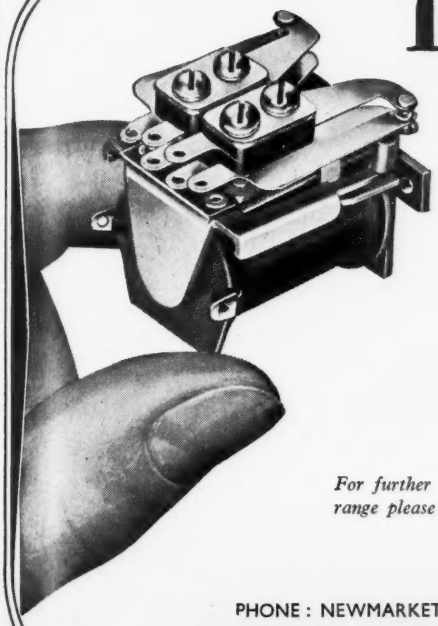

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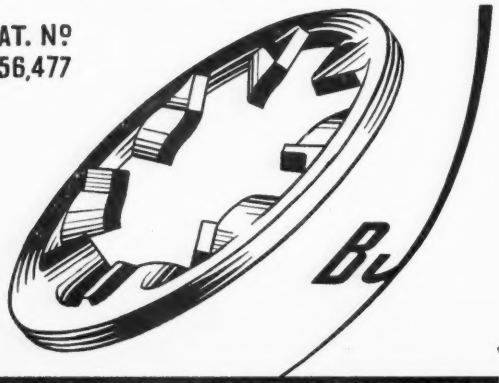

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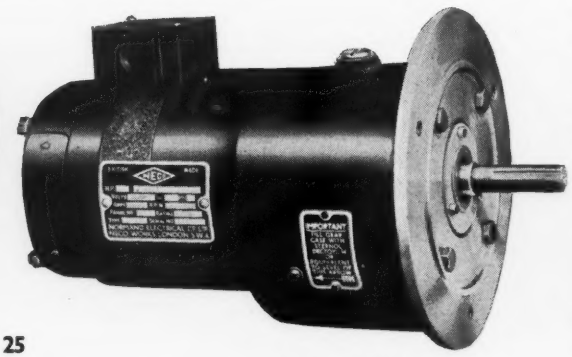

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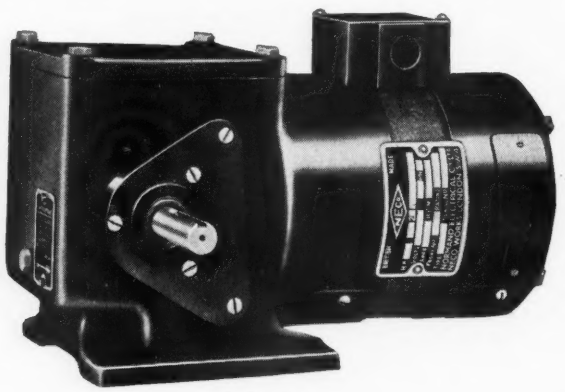

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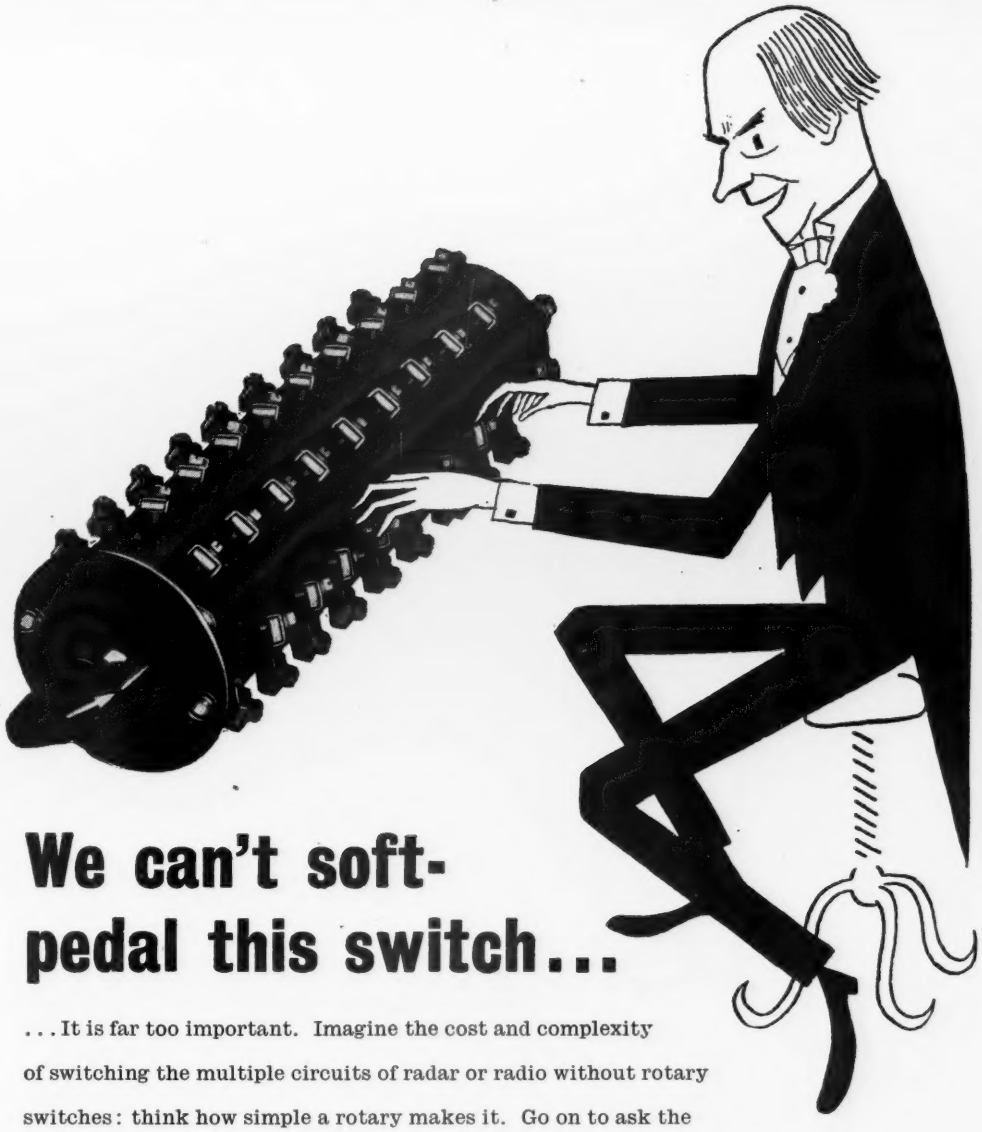

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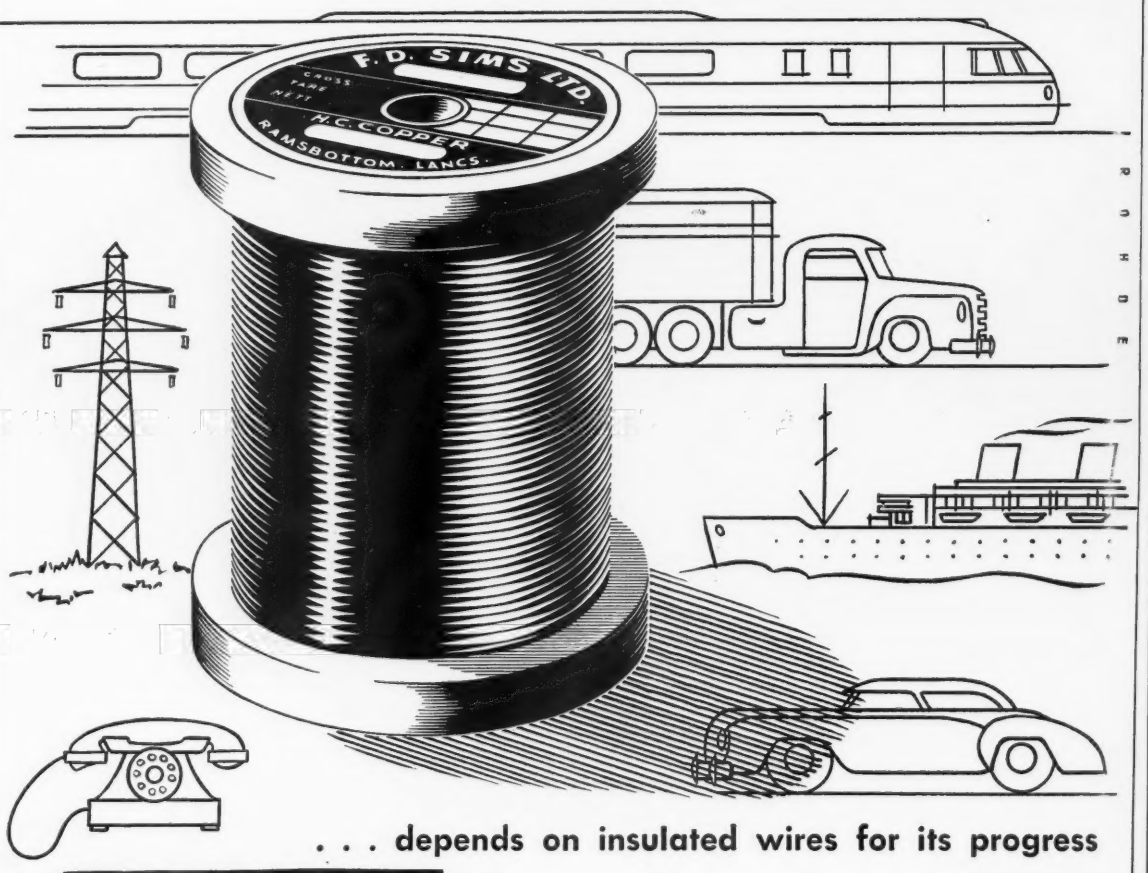

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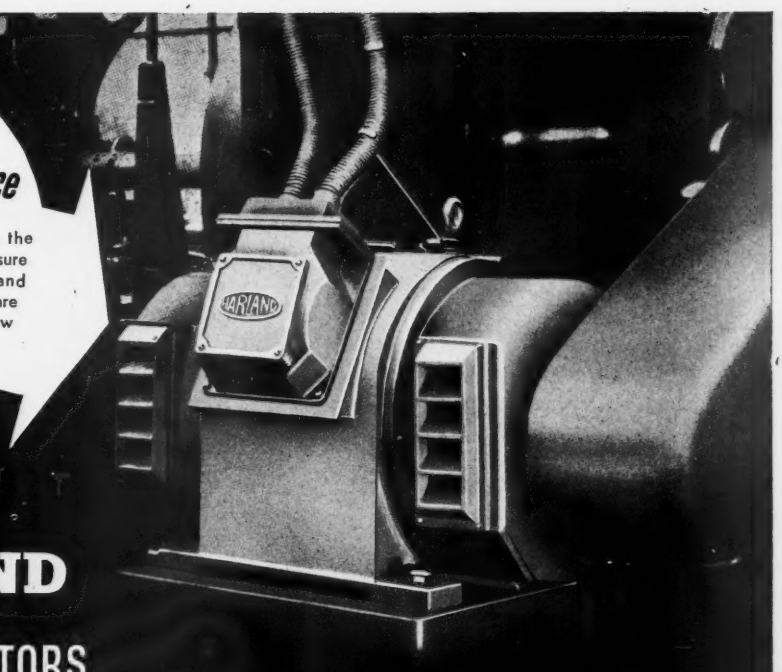

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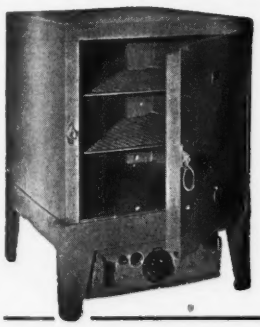

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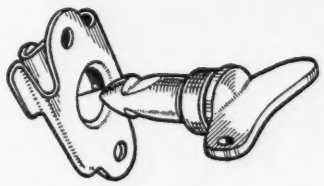

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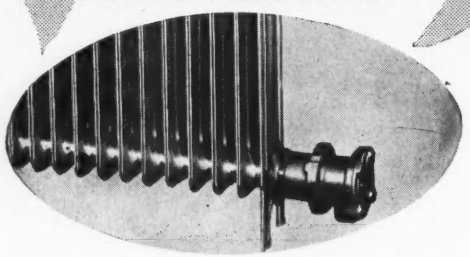

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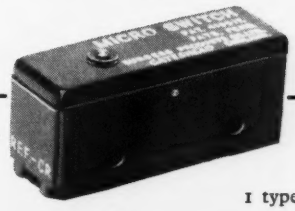

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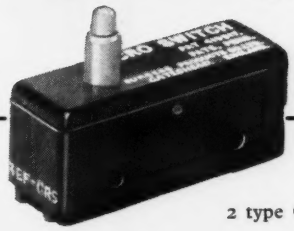
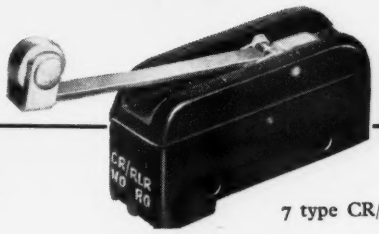


2 type CRS



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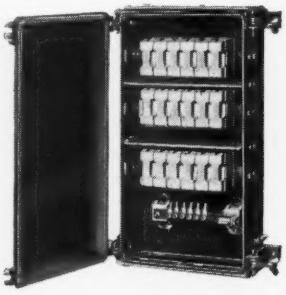

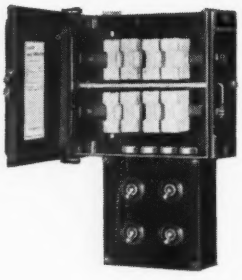

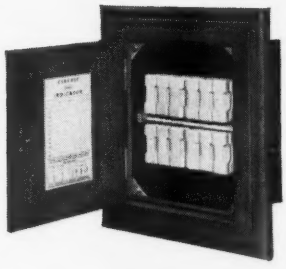

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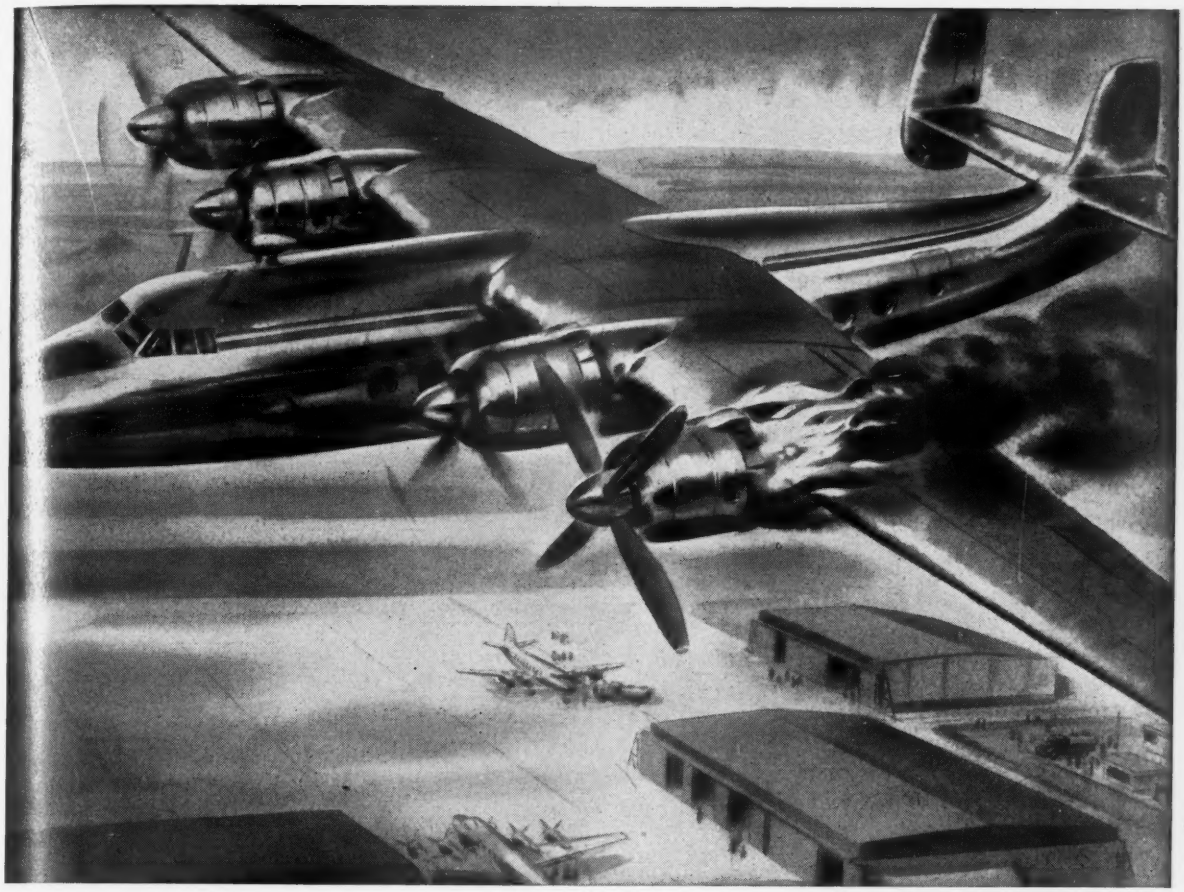

Once this would have meant almost certain disaster . . .

Today it probably means no more than an extra job for the ground staff—for modern multi-engined aircraft will fly with one or more engines shut-down . . . provided the controls to the remaining engines are intact. This is one reason why most aircraft use 'Fibreglass' insulated Pren* cables which stand up to direct exposure to flame. Other reasons — which apply to all 'Fibreglass' electrical insulation — are less weight, less space, greater heat resistance, higher safe working-temperatures, freedom from alkali with consequent resistance to moisture. All of which mean longer life and greater reliability.

**'Pren' cables incorporate one or more layers of braided glass fibre and are finished with a fire-retarding lacquer.*

wrap it in* FIBREGLASS *for safety

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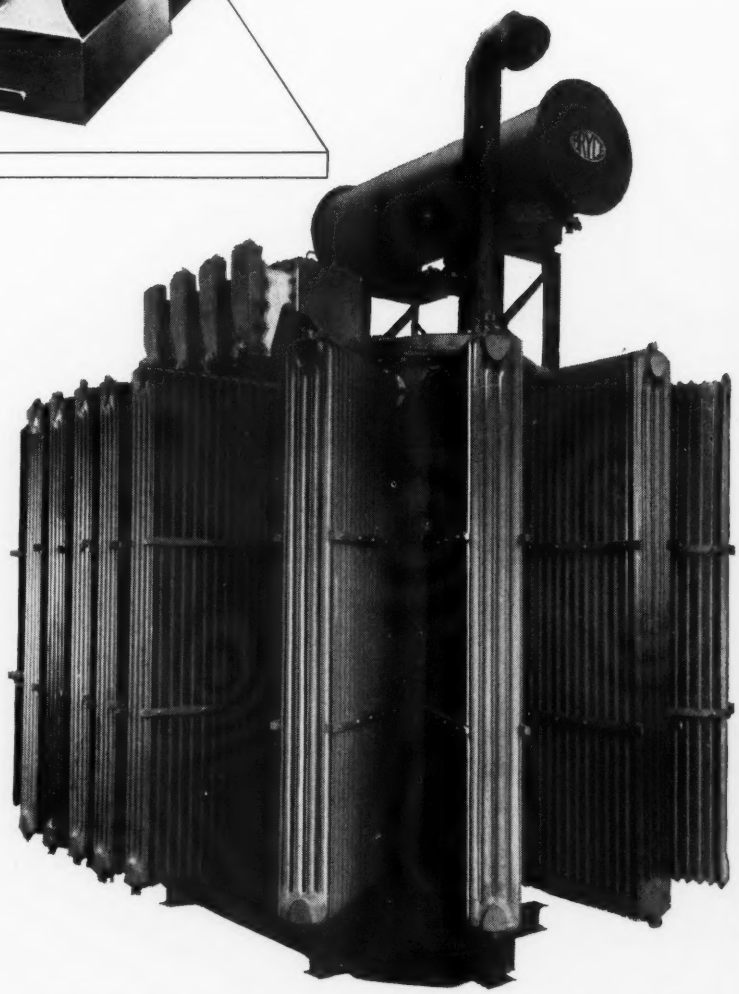
... and remember the transformer must be **BRYCE**



DURING the life of a transformer it is certain to be subjected to severe service conditions. It is then that the liberal design and superior workmanship of the Bryce transformer prove their worth.

Be sure to consult Bryce before ordering Power Transformers.

Illustrated is a 7500 kVA, 31500/6600 volt, 3 phase, 50 cycles transformer.

Larger transformers can be built up to 15000 kVA at 132 kV.

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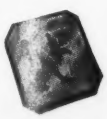

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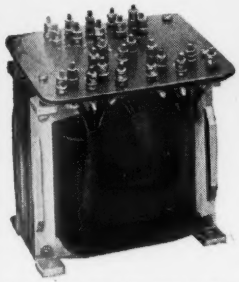

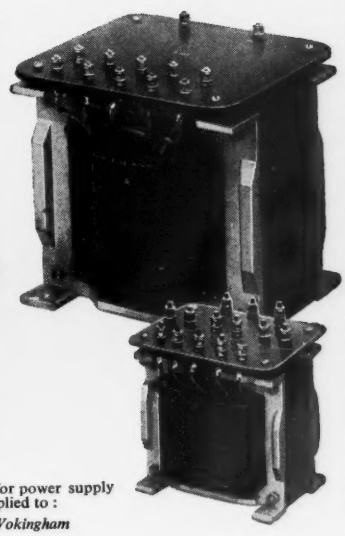

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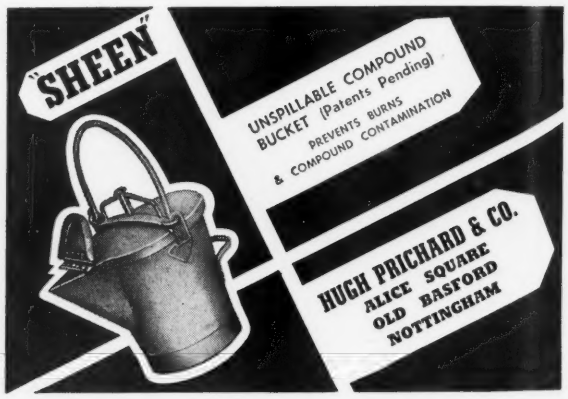

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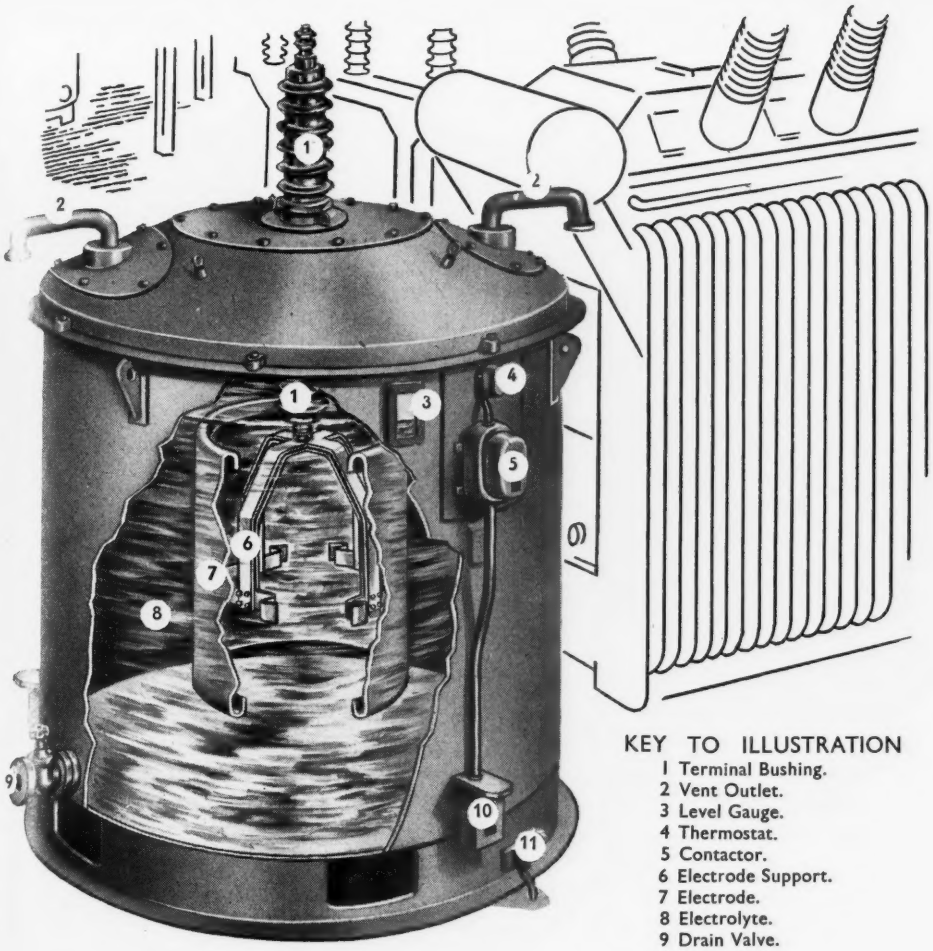

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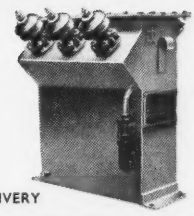

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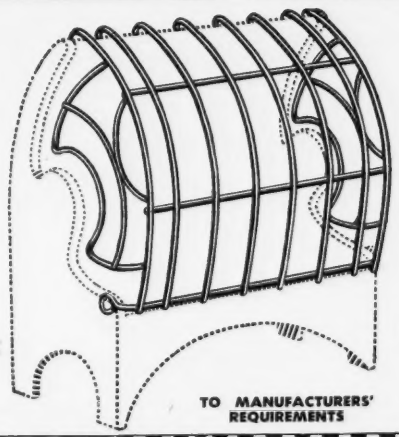

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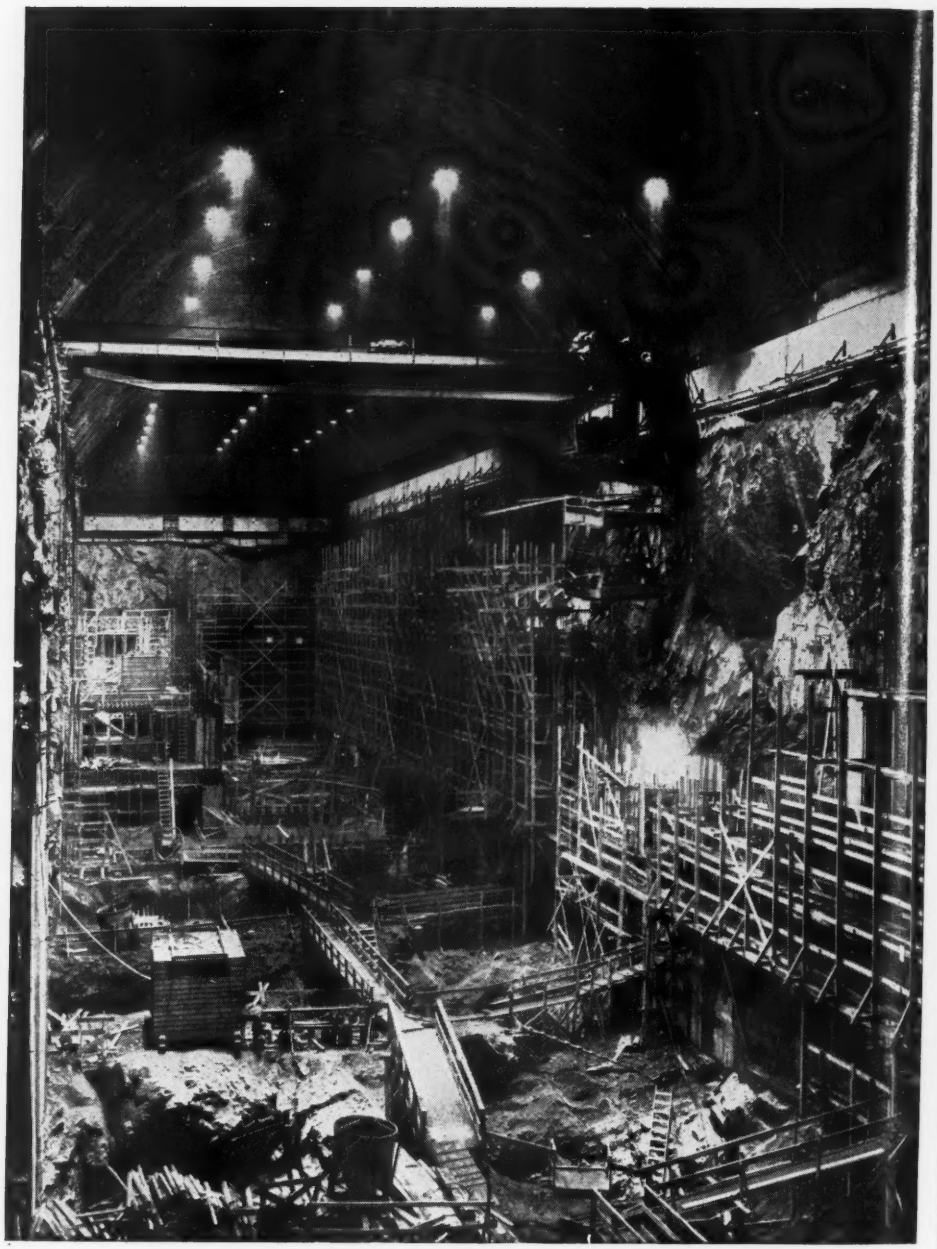

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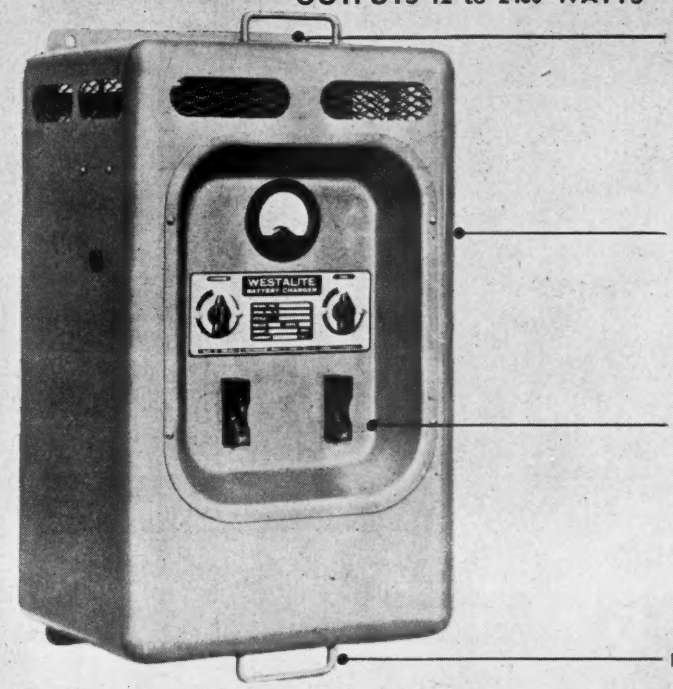

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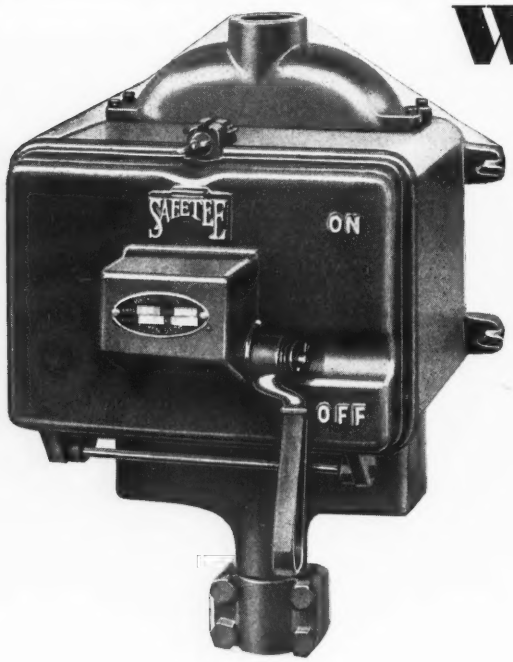

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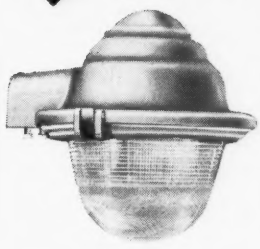
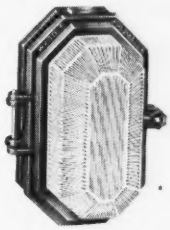


ASHLEY Lantern for G.L.S. or mercury discharge lamps. Three types of refractors available. Top or side entry. Interior finish white stove enamel, exterior aluminium. Positive weather sealing.



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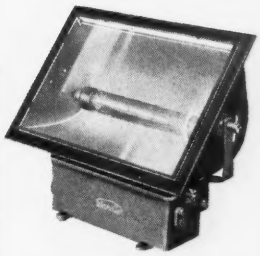

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10V.	250μA.	10V.	1A.	*Maximum indication 20MΩ.*
25V.	1mA.	25V.	2·5A.	0–2,000Ω — using internal batteries.
100V.	10mA.	100V.	10A.	0–200,000Ω — using internal batteries.
250V.	100mA.	250V.	—	0–20MΩ — using internal batteries.
1,000V.	1A.	1,000V.	—	
2,500V.	10A.	2,500V.	—	0–200MΩ — using external batteries.

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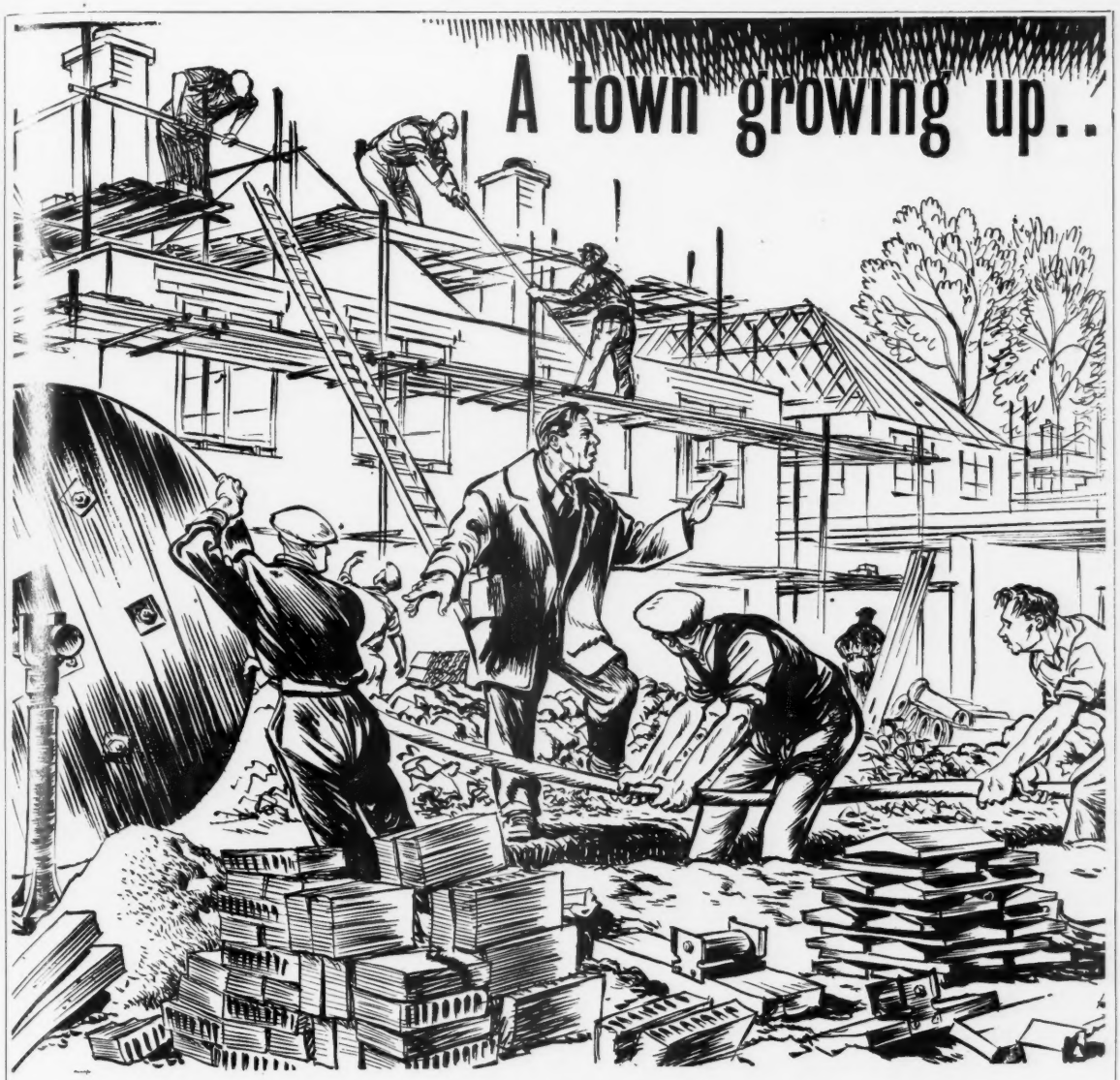

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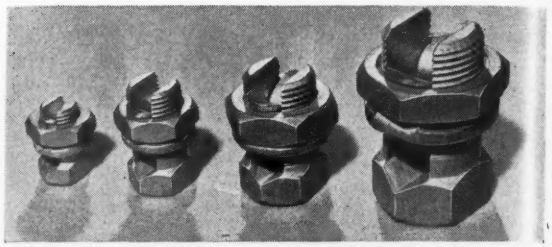
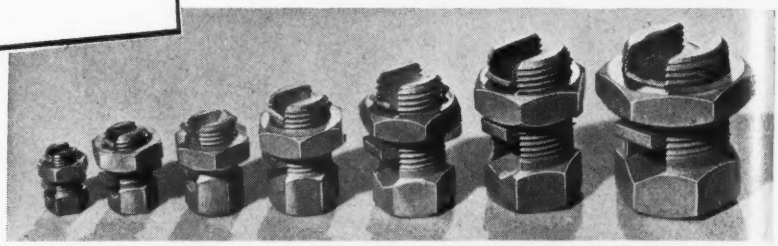
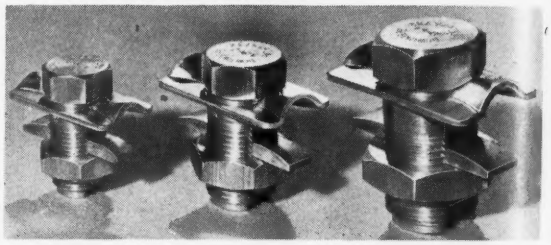


"V Series" in Naval Brass (to BES L1 drawing No. BE/L/E4.)



Above: **H.D. Series in Heavy Commercial Brass.**
Below: **A.L. Series in Aluminium.**



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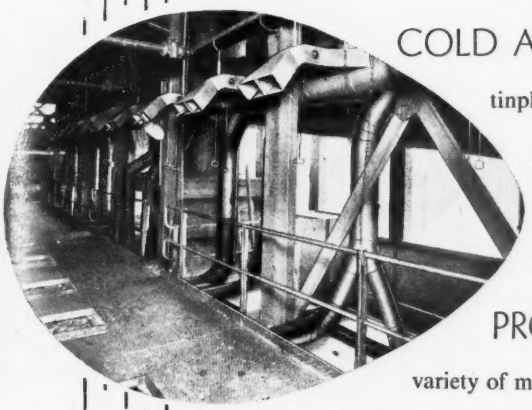
Sturtevant

VENTILATION SYSTEMS

POSITIVE VENTILATION



COLD AIR DOUCHE PLANTS for steel rolling mills; tinplate works; gas works; glass works and other factories where men must of necessity work at sources of intense heat; also MAN COOLING FANS where a central plant cannot be installed.

PRODUCT COOLING PLANTS for a wide variety of manufactures — machinery in operation, etc., largely a matter of individual treatment.

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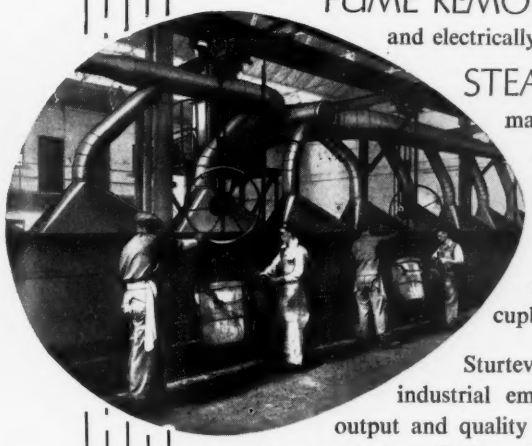

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STEAM REMOVAL from dye houses; paper making machinery; foodstuffs; boiling pans, etc.

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CORROSIVE FUME REMOVAL from dipping and cleaning vats; pickling plants; fume cupboards, etc., by ejector draught and direct fan exhaust.

Sturtevant Exhaust and Positive Ventilation systems make industrial employment more tolerable, and are a source of improved output and quality of product. Individual attention is given to all problems of mechanical ventilation. Details available from our publications U.3603 and U.3702.

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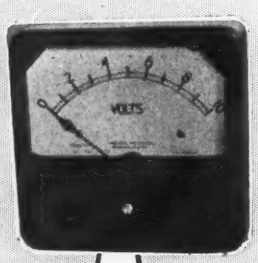
Ammeters.
Voltmeters (dial sizes 2" to 8").
Shunts, up to 10,000 Amperes.
Transductors for measurement of heavy direct currents up to 15,000 Amperes.



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Gas and Oil Operated Relays for Transformer Protection.
Special instruments and Test Rigs to customers' own requirements.

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FOR ALL ELECTRICAL APPLICATIONS TO BRITISH STANDARD SPECIFICATION OR SPECIAL TOLERANCE REQUIREMENTS.

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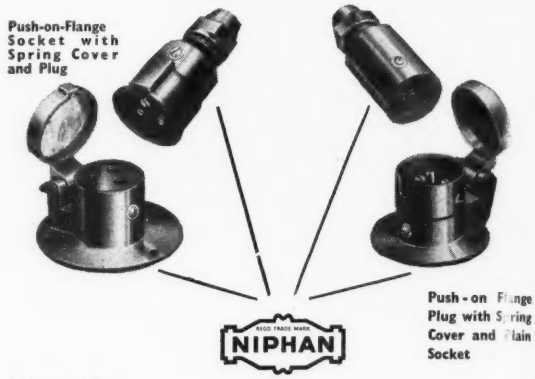
Specialists in the design and manufacture of
PUSH-ON METAL-CLAD
SOCKETS & PLUGS

5 to 40 amp. 250 to 500 volt, 3- and 4-pole earthed type. 2-pole and multi-pole. Designs to requirement.

For Electric Lighting Installations and Power Transmission, Communication, Portable Tools, etc.



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VICTORIA HOUSE, SOUTHAMPTON ROW, LONDON, W.C.1
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THE
NEW "MIDCOIL"
variable output TRANSFORMER
WITH SUPERFINE VOLTAGE CONTROL AND
OUTPUTS UP TO 20 KVA

Example: 0–280 volts, variable from zero to full voltage in finely graded steps giving control throughout the range to within 0·12 volts at full load with extremely **GOOD REGULATION**

Of particular interest to **DESIGNERS** of test equipment and with many other **INDUSTRIAL USES,** such as electric furnaces, etc.
FULL DETAILS and **PRICES** on request.

Other types include **LOW VOLTAGE** auto transformers, **3 PHASE** and **PHASE CONVERSION** types, designed and produced to customers' specifications.

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A Quality Product from
THE MIDLAND COIL WINDING COMPANY LTD.
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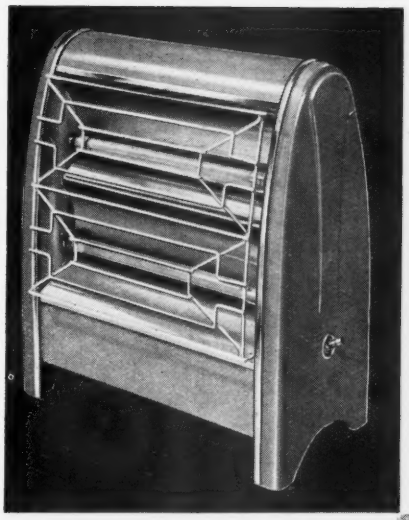
OLYMPIAN REFLECTOR
Cat. Nos. 95708/9, available Nov., 1954.
1 kW 50/- + 18/4 P.T.
2 kW 65/- + 23/10 P.T.



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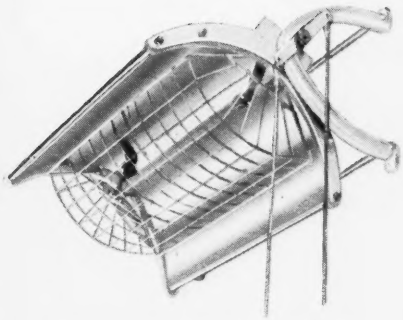
The clean lines and attractive finish of this new range reflect the inherent quality which distinguishes all Falks products. Priced to meet today's conditions, they will find ready acceptance among your customers.



BATHROOM FIRE, 1 kW. Cat. No. 95670.
63/- + 23/1 P.T.

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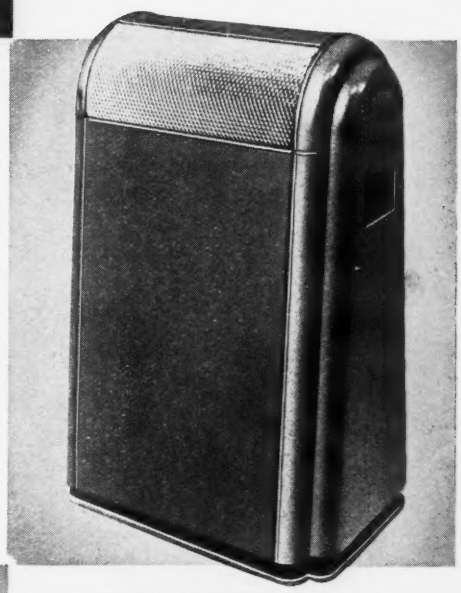
Cat. No. 95691.
68/3 + 24/11 P.T.



PEERLESS CONVECTOR, 2 kW. Cat. No. 95699, available Nov., 1954.
210/- + 77/- P.T.

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FALK, STADELMANN & CO. LTD.

Falk, Stadelmann & Co. Ltd., 91 Farringdon Road, London, E.C.1
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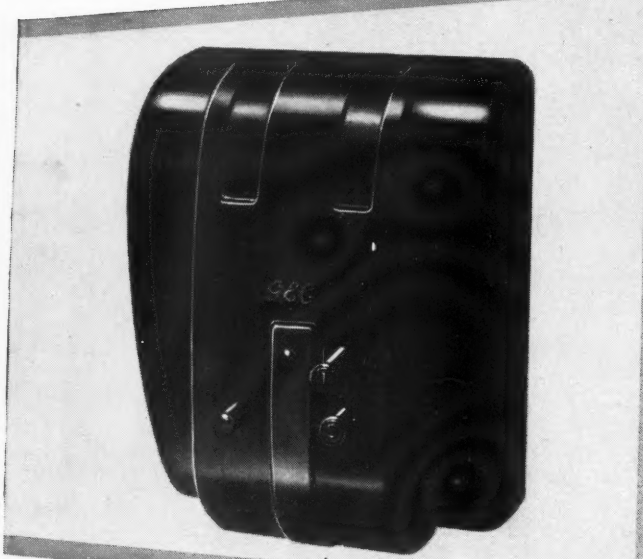
Earth Leakage CIRCUIT BREAKERS

Recommended under I.E.E. Regulations

X8408—DOUBLE POLE TYPE



X8411—FOUR POLE TYPE

Regulation No. 1005B of I.E.E. Regulations for the Electrical Equipment of Buildings (12th edition) requires that if the resistance of an earth electrode to the main body of earth is over 1 ohm, the earthing of tne apparatus shall be supplemented by a leakage trip.

Single pole, double pole and four pole types are available. The four pole type can also be used to protect a motor circuit or two single phase circuits. Each circuit breaker is complete with a test key.

X8359—SINGLE POLE TYPE

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CLASSIFIED ADVERTISEMENTS

ADVERTISEMENTS are accepted up to **First Post on Monday** of the week of issue, and should be addressed to Classified Advertisement Department, Dorset House, Stamford Street, London, S.E.1.

CLASSIFIED advertisements are PREPAID at 3/- per line (approx. 6 words) per insertion. Where an advertisement includes a Box Number this counts as two words and carries an additional charge of 1/-.

DISPLAYED:—£2 per inch, per insertion. Cheques and Postal Orders should be crossed and made payable to ELECTRICAL REVIEW PUBLICATIONS LTD.

SITUATIONS WANTED:—Three insertions under this heading can be obtained for the price of two if ordered and prepaid with the first insertion.

REPLIES to Box Numbers should be addressed to the Box Number in the advertisement, c/o ELECTRICAL REVIEW, Dorset House, Stamford Street, London, S.E.1, but if not to be delivered to any particular firm or individual they should be accompanied by instructions to this effect, addressed to the Manager of the ELECTRICAL REVIEW. Replies in such cases cannot be returned. The name of an advertiser using a Box Number will not be disclosed.

Original testimonials should not be sent with applications for employment

OFFICIAL NOTICES, TENDERS, ETC.

ELLESMERE PORT URBAN DISTRICT COUNCIL

Contract No. 162

Public Lighting Installation, Chester/Birkenhead Road (A.41) at Childer Thornton

TENDERS are invited for the provision and erection of 19 Sodium Discharge Lamps.

The drawings may be seen by appointment, and a set of tender documents, comprising the Institution of Electrical Engineers recommended conditions of contract, specification, bills of quantities and form of tender, may be obtained at the offices of the Council's Engineer and Surveyor, Queen Street, Ellesmere Port, on and after Saturday, 25th September, 1954, on payment of a deposit of two guineas, which deposit will be refunded on the return of the contract documents, or, in the case of a bona fide tenderer which is accepted and not subsequently withdrawn, on completion of the formal contract between the Council and the successful tenderer.

Sealed tenders in the plain official envelope provided, together with contract documents, must reach the undersigned by not later than 5 p.m. on Monday, 11th October, 1954. Tenders received after this date and time will not be considered by the Council, and the Council do not bind themselves to accept the lowest or any tender.

P. J. HODGES,
Clerk of the Council.

Council Offices,
Whitby Hall,
Ellesmere Port, Cheshire.
21st September, 1954. 5260

DISPOSAL OF PLANT

THE BRITISH ELECTRICITY AUTHORITY invites tenders for the demolition, disposal and sale of redundant plant at Nottingham Power Station. The plant includes two rail wagon tipplers for handling 10-12-ton wagons of small coal; coal belts, bucket elevators, lead/acid battery, evaporators, sundry structural steelwork and other items.

The specification of plant and conditions of sale, No. 6/Nottingham/56/M25A, may be obtained from the Divisional Controller, British Electricity Authority, East Midlands Division, Barker Gate, Nottingham, quoting reference GC/185/43/M25A.

Applications in writing should be accompanied with a deposit of £2, which will be returned on receipt of a bona fide tender. The specification is not transferable.

Tenders are to be delivered to the Divisional Controller not later than 12 noon on Monday, 11th October, 1954. 5209

BOROUGH OF ROYAL TUNBRIDGE WELLS

Street Lighting: Eridge Road

TENDERS are invited for the supply and installation of 24 Concrete Street Lighting Columns, Group A standard, together with lanterns and all auxiliary equipment.

Specifications and bills of quantities may be obtained from the Borough Surveyor and Water Engineer, Town Hall, Tunbridge Wells, on payment of one guinea, which will be refunded upon receipt of a bona fide tender and return of all documents.

Tenders in plain sealed envelopes endorsed "Tender for Street Lighting, Eridge Road," must be delivered to the undersigned not later than noon 19th October, 1954.

M. J. H. GIRLING,
Town Clerk.

Town Hall,
Tunbridge Wells. 5303

BRITISH ELECTRICITY AUTHORITY

Eastern Division

Plant for Disposal

TENDERS are invited for the dismantling and removal of the following items of generating plant, including auxiliaries and spare parts, now installed at Bedford Generating Station:—

(1) Two Stirling Water Tube Boilers for steam conditions, 200 p.s.i., 600° F.

(2) Two Turbo-Alternators for steam conditions, 190 p.s.i., 580 F., comprising:—
One B.T.H. Set, 1,800 kW, 6,600 volts, 3-phase, 50 cycles.
One C. A. Parsons Set, 1,500 kW, 6,600 volts, 3-phase, 50 cycles.

The plant may be inspected by arrangement with the Station Superintendent, Bedford Generating Station, Prebend Street, Bedford, from whom may be obtained further details and conditions of sale.

Tenders to be submitted by the 18th October, 1954, to the Controller, British Electricity Authority, Eastern Division, Northmet House, Southgate, London, N.14.

W. N. C. CLINCH,
Controller.

2/4471
2/ED/2222 5245

BOROUGH OF TODMORDEN

Supply and Delivery of Electric Cable and Steel Conduit

TENDERS are invited for the supply and delivery of (a) 7,300 yards of polythene insulated and P.V.C. sheathed single-core 660-volt Electric Cable in various sizes from 7/.029 to 7/.064, and (b) 6,300 ft. of 1″ internal diameter and 980 ft. of ¼″ internal diameter mild steel continuous Welded Tube to B.S. 1387, in random lengths, screwed and socketed and protected internally with bitumen lining and externally with bitumen coated glass tissue wrapping, all pipes to be Class B, together with 28 ¼″ galvanised back-nuts and 180 1″ galvanised back-nuts, to B.S. 1740.

Contractors may tender for either section (a) or section (b) or both, and the necessary documents may be obtained from the Borough Engineer, Rise Lane, Todmorden.

Tenders should be forwarded to the undersigned in a plain sealed envelope endorsed "Trunk Road Lighting," not later than the 11th October, 1954.

J. D. MOYS,
Town Clerk.

Municipal Offices,
Rise Lane, Todmorden. 5302

INDIA STORE DEPARTMENT

DIRECTOR-GENERAL, Supplies and Disposals, New Delhi, invites tenders for the supply of:—

	Nos.
Directly coupled diesel-driven Alternator Set, 325 kVA, 440 volts, 3-phase, 4-wire, 50 cycles, each complete with board and control gear	5
Diesel-Electric Generating Set, 325 kV, 440-400/254-231 volts	1
Transformer Control Cubicle	12
L.T. Feeder Control Cubicle	2
Station Auxiliaries Control Cubicle ...	1

Please apply for tender forms to Director-General, India Store Department, 32/44, Edgware Road, London, W.2, with remittance of fifteen shillings in favour of the High Commissioner for India, quoting reference S.2327/54. Tenders are due to be returned direct to New Delhi by 29th October, 1954. 5259

BOROUGH OF MITCHAM

Street Lighting Improvements, Stages IV, V & VI

Streatham Rd. (A.216), Carshalton Rd. (A.237), Commonside West and Croydon Road (A.236)

TENDERS are invited for the erection of 142 Single-Arm Reinforced Concrete Columns with 140-watt Sodium Discharge Lamps and ancillary gear of approved pattern, complete with all wiring.

Form of tender, specification and schedule may be obtained from the Borough Engineer and Surveyor, Town Hall, Mitcham, at whose office the drawings and general conditions of contract may be inspected.

Tenders must be delivered to the undersigned, in the envelope provided, not later than 12 noon on Saturday, 2nd October, 1954.

The Council do not bind themselves to accept the lowest or any tender.

R. H. WHITE,
Town Clerk.

Town Hall,
Mitcham, Surrey.
10th August, 1954. 5258

BOROUGH OF GRANTHAM

Electric Street Lighting

TENDERS are invited for the supply and erection of 668 Concrete Lighting Columns and Wall Brackets, together with lanterns and control gear.

Specification and bills of quantities may be obtained from the Borough Engineer and Surveyor, Guildhall, Grantham, on payment of a deposit of £2 2s., which will be returned on receipt of a bona fide tender.

Tenders in plain sealed envelopes endorsed "Tender for Street Lighting" should reach the undersigned not later than 10 a.m. on Tuesday, 12th October, 1954.

JOHN F. GUILE,
Town Clerk.

Guildhall, Grantham.
September, 1954. 5079

BOROUGH OF DAGENHAM

Street Lighting: Stage V Conversion Scheme

TENDERS are invited for the supply, delivery and erection of 317 Group B Electric Lighting Units and the conversion of an additional 10 existing lighting units in ten roads situate in various parts of the borough.

Specification and tender forms from the Borough Engineer and Surveyor. Layout drawing may be viewed by appointment.

Tenders, in envelope bearing no external indication of the identity of the sender and endorsed "Street Lighting, Stage V Conversion Scheme," must be delivered to the undersigned by 20th October, 1954. The Council do not bind themselves to accept the lowest or any tender.

KEITH LAUDER,
Town Clerk.

Civic Centre,
Dagenham. 5301

BOROUGH OF ROMFORD

24 Flats—Electrical Installations

THE Council invite tenders for the Electrical Installations to 24 flats on the Gobions Estate.

The specification and form of tender may be obtained from the Borough Surveyor, Town Hall, Romford, on payment of £2 2s. deposit, to be refunded on receipt of a bona fide tender and all documents.

Sealed tenders must be delivered to the Town Clerk, Town Hall, Romford, not later than Monday, 11th October, 1954. 5271

SITUATIONS VACANT

The engagement of persons answering these advertisements must be made through the Local office of the Ministry of Labour and National Service, etc., if the applicant is a man aged 18-64 or a woman aged 18-59 inclusive, unless he or she or the employer is excepted from the provisions of The Notification of Vacancies Order, 1952.

NORTH WESTERN ELECTRICITY BOARD

APPOINTMENT of:—

(a) PRINCIPAL ASSISTANT, ORGANISATION, SALARIES & SUPERANNUATION SECTION.

(b) SENIOR ASSISTANT, REVENUE & BANKING SECTION, CHIEF ACCOUNTANT'S DEPT., AREA BOARD HEADQUARTERS, MANCHESTER.

Applicants for post (a) must have wide experience of superannuation, salaries and wages, preferably in the electricity supply industry. Experience on procedure and methods and possession of appropriate professional qualifications would be an advantage.

Applicants for post (b) must have had wide experience in accountancy, particularly in the preparation of final accounts. Possession of appropriate professional qualifications would be an advantage.

Salary scales:—
Post (a) £895/£1,000 p.a. Grade 8
Post (b) £670/£730 p.a. Grade 5

N.J.C. conditions.

Appointment of GENERAL ASSISTANT ENGINEER (TELECOMMUNICATIONS), TECHNICAL & RESEARCH ENGINEER'S SECTION, CHIEF ENGINEER'S DEPT., AREA BOARD HEADQUARTERS.

Duties will include maintenance of V.H.F. radio equipment throughout the Board's area. Possession of H.N.C. in Electrical Engineering or equivalent qualifications will be an advantage.

Commencing salary within range £501/£639 p.a. rising to £714 p.a., Schedule C, Class AX/EX, Grade 8, N.J.B. conditions.

Applications for the above posts to Establishment Officer, North Western Electricity Board, Cheetwood Road, Manchester, 8, by 9th October, 1954.

Appointment of GENERAL ASSISTANT ENGINEER (TESTING ASSISTANT), POLYGON TESTING STATION, ARDWICK, MANCHESTER.

Applicants should be experienced in testing meters, instruments (including standardisation), cables, protection equipment and substation plant, and should hold H.N.C. in Electrical Engineering or its equivalent. Experience in a manufacturer's works will be an advantage.

Salary scale £692/£716 p.a., Grade N.13, N.J.B. conditions.

Appointment of SENIOR COMMERCIAL ASSISTANT, SUB-AREA CONSUMERS' ENGINEER'S DEPARTMENT, MANCHESTER.

Duties involve assisting in the general organisation of sales activities in the Sub-Area, particularly relating to domestic and commercial consumers. Applicants should have had a wide experience in the organisation and supervision of service centres; planning sales campaigns, preparation of staff training lectures; interior and window displays and exhibition layouts; preparation and giving of lecture demonstrations to outside organisations, and dealing with all types of correspondence from domestic and commercial consumers. Technical knowledge of appliances and installations will be an advantage.

Salary scale £730/£805 p.a., Grade 6, N.J.C. conditions.

Applications for the above posts to the Sub-Area Secretary, No. 1 Sub-Area, North Western Electricity Board, Town Hall, Manchester, P.O. Box 493, by 9th October, 1954.

Appointment of THIRD ASSISTANT ENGINEER (SYSTEM PLANNING & DEVELOPMENT), SUB-AREA TECHNICAL ENGINEER'S DEPARTMENT, BOLTON.

Applicants must have had a sound training in electrical engineering to degree or H.N.C. standard and responsible experience in several of the following branches:—

(1) Planning and construction of 33-kV and lower voltage systems.
(2) Maintenance and operation of 33-kV and lower voltage systems.
(3) Substation design and construction.
(4) Calculation of fault levels, etc.
(5) Estimating and specification of distribution plant.

The successful applicant will be required to work at Westhoughton for a period after appointment, but will eventually be located at Bolton.

Salary scale £766/£794 p.a., Grade L.10, N.J.B. conditions.

Appointment of ENGINEERING DRAUGHTSMAN, LEIGH.

Applicants must have had a good technical training and drawings office experience, and should have had experience in the preparation of drawings for some or all of the following:—

Switchgear layout and diagrams.
Substation layout and construction.
Overhead line design.
Preparation of wayleave and other plans.

Preference given to applicants holding the O.N.C. in Electrical Engineering and/or Building.

Salary within range £433/£567 p.a. according to qualifications and experience, Schedule D, Grade 6, N.J.B. conditions.

Applications for the above posts to Sub-Area Manager, No. 2 Sub-Area, North Western Electricity Board, National Buildings, St. Mary's Parsonage, Manchester, 3, by 9th October, 1954.

Appointment of ASSISTANT (DOMESTIC AND COMMERCIAL SALES), SUB-AREA CONSUMERS' ENGINEER'S DEPARTMENT, KENDAL.

Applicants should have had experience in exhibition and display organisation and advertising and have a good knowledge of agricultural and horticultural applications of electricity.

Salary scale £485/£545 p.a., Grade 2, N.J.C. conditions.

Appointment of GENERAL ASSISTANT DISTRICT COMMERCIAL ENGINEER, CARLISLE DISTRICT.

The successful applicant will be required to assist in the preparation of estimates and in the supervision of contract work for commercial, industrial and street lighting schemes. Experience in agricultural applications of electricity would be an advantage. H.N.C. standard of education is desirable.

Salary scale £447/£460 p.a., Grade E.13, N.J.B. conditions.

Applications for the above posts to Sub-Area Manager, No. 6 Sub-Area, North Western Electricity Board, Castle Green, Kendal, by 9th October, 1954. 5293

MIDLANDS ELECTRICITY BOARD

APPLICATIONS are invited for the following superannuable posts:—

THIRD ASSISTANT DISTRICT ENGINEER, EVESHAM DISTRICT, WORCESTER AND DISTRICT SUB-AREA. Duties will be primarily concerned with the installation and maintenance of underground H.V. and L.V. mains and ground mounted substations. Experience in the operation and maintenance of overhead distribution systems is, however, necessary. Technical qualifications desirable. Salary £587/£600 per annum (N.J.B. Class E, Grade 9).

Apply in writing, within 14 days, stating age, experience, present salary and position, to Mr. R. Mallet, Sub-Area Manager, Midlands Electricity Board, Whittington, Worcester.

ARCHITECTURAL DRAUGHTSMAN, SHROPSHIRE AND HEREFORDSHIRE SUB-AREA HEADQUARTERS. Applicants should be conversant with modern building practice and proficient in the preparation of drawings required for the construction of substation buildings and alterations thereto. Experience in the Electricity Supply Industry will be an advantage. Salary £433/£567 per annum (N.J.B. Schedule D, Grade 6).

Apply in writing, within 14 days, stating age, experience, present salary and position, to Mr. W. Winwood, Sub-Area Manager, Midlands Electricity Board, Spring Gardens, Ditherington, Shrewsbury.

A. STEPHENS,
Secretary. 5306

SOUTHERN ELECTRICITY BOARD

Assistant Engineer (Maintenance and Operation)

STAINES District of No. 1 (Southall) Sub-Area. Salary N.J.B. Class F, Grade 9, Column 1 (£637 7s. per annum, inclusive of London allowance). N.J.B. conditions of service.

The duties of the post will be to assist with the maintenance and operation of switchgear, transformers, cables and overhead lines up to and including 11 kV, and the appointment will involve stand-by duties.

Applications on forms obtainable from the Sub-Area Secretary, 2/6, Windmill Lane, Southall, Middlesex, and returned to him in envelopes suitably endorsed, not later than 15th October, 1954.

Junior Engineers (2)

(a) Newbury Sub-Area and (b) Newbury District. The commencing salary will be fixed according to the successful applicants' experience and qualifications in accordance with Class 35 of the N.J.B. Agreement, i.e.

Class	Minimum Grade	Maximum Grade
(a) L	20 (£404)	16 (£547)
(b) E	15 (£390)	14 (£445)

N.J.B. conditions of service.

The duties of the posts will be:—

(a) Principally to undertake the testing of protection relays and H.V. 3-phase metering equipments.

(b) To assist with distribution duties including minor construction work and general maintenance.

Applicants should have received technical training to O.N.C. standard and have experience of similar work.

Applications on forms obtainable from the Sub-Area Secretary, 7, Oxford Road, Newbury, and returned to him in envelopes suitably endorsed, not later than 15th October, 1954.

Junior Engineer

Meter Section of No. 1 (Southall) Sub-Area, Engineering Department, Waterloo Road, Uxbridge. Salary N.J.B. Class L, Grade 16, Column 3 (£574 7s. per annum, inclusive of London allowance). N.J.B. conditions of service.

Applicants should have experience in three-phase meter testing, instrument transformer testing, assisting in the standardising of watt-meters, and assisting in the commissioning of special equipment.

Applications on forms obtainable from the Sub-Area Secretary, 2/6, Windmill Lane, Southall, Middlesex, and returned to him in envelopes suitably endorsed, not later than 15th October, 1954.

The successful candidates for the above appointments will be required to contribute to the B.E.A. and Area Boards Superannuation Scheme, if eligible.

Meter Repairer (Mechanician) Chargehand

Meter Section of No. 1 (Southall) Sub-Area. Engineering Department, Waterloo Road, Uxbridge. The rate of pay (4s. 3d. per hour) and conditions of service will be in accordance with the National Joint Industrial Council Agreement for the Electricity Supply Industry.

The duties of the post will be to take charge of small section dealing with repair and calibration of indicating recording instruments, etc., together with the reconditioning of pivots and jewels.

Applications, in writing, stating age, qualifications and experience, to the Sub-Area Secretary, 2/6, Windmill Lane, Southall, Middlesex, not later than 15th October, 1954. 5314

BRITISH ELECTRICITY AUTHORITY

North West, Merseyside and North Wales Division

APPLICATIONS are invited for the appointment of ASSISTANT ENGINEER (Operation) at the Percival Lane Power Station, Runcorn, Cheshire. Salary £534/£555 p.a., N.J.B. Class G, Grade 12. Superannuable and subject to medical examination.

Applicants should have experience in the control room of a modern power station and possess the Higher National Certificate or equivalent qualifications.

Application forms from the Divisional Controller, Beaconsfield Road, Woolton, Liverpool. Closing date 8th October, 1954. 5262

YORKSHIRE ELECTRICITY BOARD

No. 5 (Wakefield) Sub-Area

SENIOR ASSISTANT COMMERCIAL ENGINEER. Applicants must have had wide and responsible commercial experience in the development of electricity supplies for all purposes and in negotiations with large industrial consumers.

The successful applicant will be responsible to the Sub-Area Commercial Officer for the industrial, street lighting and general consumer development aspects of the Sub-Area organisation. Preference will be given to those who are Corporate Members of the Institution of Electrical Engineers.

Salary N.J.B. Class K, Grade 4, £1,093/£1 141 per annum.

WAKEFIELD DISTRICT.

GENERAL ASSISTANT DISTRICT ENGINEER. Applicants must have had a sound practical training with experience in the construction, operation and maintenance of H.V. and M.V. overhead and underground distribution networks, substation plant and ancillary equipment.

Applicants must hold a current driving licence, be prepared to reside in the district and undertake standby duties.

Applicants must hold at least Higher National Certificate in Electrical Engineering.

Salary N.J.B. Class F, Grade 11, £548/£565 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 5 (Wakefield) Sub-Area, Yorkshire Electricity Board, 1a, Denby Dale Road, Wakefield, not later than 14th October, 1954.

No. 3 (Sheffield) Sub-Area

ENGINEERING DRAUGHTSMAN. Applicants should be first-class draughtsmen, preferably with experience on mains recording with a public utility authority, capable of compiling accurate and permanent records from particulars obtained on site and carrying out survey work for the revision of ordnance maps and plans.

Salary N.J.B. Schedule D, Grade 6, £433/£567 per annum.

SHEFFIELD NORTH AND SOUTH DISTRICTS.

ASSISTANT INSTALLATION ENGINEER. Applicants should possess a sound technical training and preferably be Graduate Members of the Institution of Electrical Engineers or possess similar qualifications.

The duties of the post include negotiations with consumers for new and additional supplies of electricity, advice on tariffs and utilisation, including power factor correction, specifications, estimates and tenders for all classes of installation work, supervision of installations on site, and control of staff and workpeople.

Salary N.J.B. Class L, Grade 12, £667/£692 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 3 (Sheffield) Sub-Area, Yorkshire Electricity Board, Commercial Street, Sheffield, not later than 14th October, 1954. 5294

JOHNSON & PHILLIPS LTD.

have vacancies for DRAUGHTSMEN in their

(a) Junction Box Dept.
(b) Contract Dept.

Applicants in the case of (a) should have experience in cable boxes and accessories, and in regard to (b) experience in overhead lines, wood poles, steel towers, etc. Applications, giving particulars of age, experience and salary expected, to Employment Manager, Johnson & Phillips Ltd., Victoria Way, Charlton, London, S.E.7. 5264

SOUTH LANCASHIRE TRANSPORT COMPANY, ATHERTON

SHIFT CHARGE ENGINEER required for the Atherton Power Station. Applicants must have experience in the operation of turbo-generators and water tube boilers. Salary £559-£586 (N.J.B., Class B/7).

Apply in writing stating age and experience to E. H. Edwardes, A.M.I.E.E., M.Inst.T., Managing Director, South Lancashire Transport Company, Atherton, Lancs. 5291

BRITISH ELECTRICITY AUTHORITY

Southern Division

APPLICATIONS are invited for the following positions:—

SENIOR ENGINEERING DRAUGHTSMAN (Mechanical), Construction Department (S/13.568). Applicants should have had experience of work concerning turbines and auxiliaries, boilers and auxiliaries, coal and ash handling plant and pipework.

SENIOR ENGINEERING DRAUGHTSMAN (Electrical), Construction Department (S/13.569). Applicants should have had experience of the layout of switchgear cables and lighting in connection with power station construction. Experience in schematic diagrams an advantage.

SENIOR ENGINEERING DRAUGHTSMAN (Civil and Building), Construction Department (S/13.570). Applicants should have had experience of design and detailing of either industrial buildings, or structural steelwork, or reinforced concrete structures and piled and slab foundations for heavy plant, or drainage and sanitation schemes.

Candidates should have a good technical education in either mechanical or electrical engineering or in architecture and building construction.

Salary N.J.B. Grade D.5, £567-£671.

GENERAL ASSISTANT ENGINEER (Buildings), Construction Department (S/13.571). Applicants should possess an Intermediate R.I.C.S. (Quantities Sub-Division) or H.N.C. (Buildings). Experience in the preparation of bills of quantities and specifications is necessary, and candidates should be able to supervise the measurement of building and civil engineering works.

Salary N.J.B. AX/CX 8, £501-£675.

GENERAL ASSISTANT ENGINEERS, Transmission Sections (S/13.572). Applicants should have had experience in the operation and maintenance of a high voltage system and preferably should have received a works training on high voltage switchgear and transformers. Candidates should possess a Higher National Certificate, or its equivalent, and possession of qualifications leading to Corporate Membership of an appropriate professional institution will be an advantage.

Salary N.J.B. AX/CX 8, £501-£675.

Special application forms for each of the above positions obtainable from P. D. A. Oliver, Divisional Secretary, 111, High Street, Portsmouth, should be returned by 13th October. 5308

SURREY EDUCATION COMMITTEE

Kingston Technical College, Fassett Road, Kingston-on-Thames

REQUIRED as soon as possible, LABORATORY TECHNICIAN for Radio and Light Electrical Laboratories. Duties include construction, maintenance and repair of electronic and electrical apparatus.

Candidates must have experience in electrical work and have reached the standard of the Ordinary National Certificate in Electrical Engineering. Preference given to holders of Higher National Certificate or equivalent.

Salary £395 × £15 to £440 × £20 to £460 p.a. plus London weighting £30 for men of twenty-six or over. N.J.C. conditions of service, including superannuation.

Applications to the Principal as soon as possible. 5305

OVERHEAD LINESMAN

required by ZANZIBAR GOVERNMENT for one tour of 2-3 years on contract. Salary scale (including present temporary allowance of £192/£257 a year) £782 rising to £1,097 a year. Commencing salary according to qualifications and experience. Gratuity of 13½% of total basic salary drawn during contract. Outfit allowance up to £60. Free passages. Liberal leave on full salary.

Candidates must have served an apprenticeship and hold the O.N.C. in Electrical Engineering or equivalent, with not less than five years' experience of construction and maintenance of L.T. and 11-kV overhead lines and services.

Write to the Crown Agents, 4, Millbank, London, S.W.1. State age, name in block letters, full qualifications and experience, and quote M2A/30667/EF. 5322

BRITISH ELECTRICITY AUTHORITY

London Division

APPLICATIONS are invited for the following superannuable posts. Conditions of service in accordance with N.J.B. Agreement, Schedule A. Salary includes London allowance. Qualifications entitling to Graduate Membership of the I.E.E. or I.Mech.E. an advantage.

ASSISTANT BOILER HOUSE SHIFT CHARGE ENGINEER, BARKING 'A' & 'B' GENERATING STATION (Vacancy No. 54/820). Experience with modern boiler house operation, including pulverised fuel, necessary. Salary Class M, Grade 11 = £793 16s. p.a.

ASSISTANT ENGINEER (INSTRUMENTS), BATTERSEA GENERATING STATION (Vacancy No. 54/821). Applicants must have served a recognised apprenticeship and have experience with the general maintenance and calibration of instruments connected with power station operation and efficiency control. Salary Class M, Grade 14 = £655 4s. p.a.

FIRST ASSISTANT STATION CHEMIST, TAYLORS LANE GENERATING STATION (Vacancy No. 54/822). Applicants must have experience in a laboratory of a modern high-pressure station and be fully conversant with the testing and analysis of fuels, oils and water. Salary Class F, Grade 9 = £637 7s. p.a.

STATION SHIFT CONTROL ENGINEER, WEST HAM GENERATING STATION (Vacancy No. 54/823). Applicants should have sound technical training and practical experience in the control and operation of steam generating plant and main switchgear in modern generating station. Salary Class H, Grade 10 = £673 1s. p.a.

Applications, quoting vacancy number, may be made on the form obtainable from Divisional Secretary, British Electricity Authority, London Division, P.O. Box No. 136, Generation House, Great Portland Street, London, W.1, to be received within 14 days of this advertisement. 5300

SEMI-CONDUCTORS

THE following personnel are required for development of new types of transistors and other semi-conducting devices, improvements of existing types and development of methods of manufacture:—

DEVELOPMENT ENGINEERS, for work on development and engineering control of production of semi-conducting devices. Qualifications science or engineering degree, preferably with factory experience.

EQUIPMENT ENGINEERS, for development of equipment for assembly and testing. Qualifications engineering degree or H.N. Certificate, preferably with factory experience.

DRAUGHTSMEN, for jig and tool design and machine layout work.

RADIO MECHANICS, for building, calibration and servicing of test equipment, including V.H.F.

Applications, stating age, qualifications and previous experience, to the Superintendent, British Thomson-Houston Co. Ltd., Lutterworth, Rugby. 5034

LEEDS COLLEGE OF TECHNOLOGY

Principal:—C. Chew, M.Sc.Tech., F.R.I.C.

Department of Electrical Engineering and Physics

APPLICATIONS are invited for the post of ASSISTANT LECTURER in Electrical Engineering subjects, duties to commence as soon as possible.

Applicants should possess recognised technical qualifications in installation technology with practical experience in electrical installation or maintenance work. Teaching experience would be an added recommendation.

Salary will be in accordance with the Burnham (Technical) Scale, Grade A, i.e. £450 × £18 to £725 per annum, with full allowances for training, industrial and teaching experience.

Further particulars and form of application to be returned by the 15th October, 1954, may be obtained by sending a stamped addressed envelope to the Chief Education Officer, Education Offices, Leeds, 1. 5315

GOLD COAST LOCAL CIVIL SERVICE

Electrical Engineer/Assistant Electrical Engineer, Gold Coast Railway

A VACANCY exists for an ELECTRICAL ENGINEER/ASSISTANT ELECTRICAL ENGINEER, Railway Department of the Gold Coast Local Civil Service. Duties are to assist in the operation of the Electrical Workshop at Location and Takoradi.

Appointment is on contract for 2 tours in the salary range £1,030-£2,020 per annum, point of entry depending on experience, plus a gratuity of £37 10s. for each completed 3 months' satisfactory service. Free 1st class passages are provided for the officer, his wife and up to 3 children under 13 years of age. Government quarters are provided at a rental of £60-£90 per annum, and leave is granted at the rate of 7 days for each completed month of resident service after a tour of 18-24 months.

Candidates, between 23 and 45 years of age, must have passed Sections A and B of the examinations for A.M.I.Mech.E. or A.M.I.E.E., or hold an engineering degree or diploma granting exemption from Sections A and B of the Institution's examination, and have had 2 years' subsequent practical experience. They should have had experience in workshop and machine practice, and a knowledge of electrical and mechanical equipment of all types of cranes. They must have served an apprenticeship or served as a graduate student with a reputable firm combining both mechanical and electrical training. In addition they should have knowledge of low-tension cable networks, distribution systems and their maintenance, and they must be capable of controlling subordinate staff. Preference given to candidates with service in R.E.M.E., R.E. or R.A.

Apply in writing to the Director of Recruitment, Colonial Office, Great Smith St., London, S.W.1, giving briefly age, qualifications and experience. Mention the reference number BCD.110/13/07/D11. 5296

BRITISH ELECTRICITY AUTHORITY

GENERATION Design Branch, Headquarters, London, invite applications for the following vacancies in the Station Development Sub-Branch.

SENIOR AND SECOND ASSISTANT ENGINEERS. Salary, including London allowance, £1,002-£1,378 and £840-£1,209 respectively.

Candidates should possess an honours degree or the requisite qualifications for Corporate Membership of either the I.Mech.E. or the I.E.E. and should have sound experience of power station design and if possible a knowledge of the selection of sites for new power stations. Duties will include the planning of new generating plant capacity throughout the country, the co-ordination and direction of investigations of sites for new stations and the suitability of existing stations for development, and negotiations for statutory and other consents.

THIRD AND GENERAL ASSISTANT ENGINEERS. Salary, including London allowance, £753-£981 and £558-£769 respectively.

Candidates should possess an honours degree or the requisite qualifications for Corporate Membership of either the I.Mech.E. or the I.E.E. Prospective Third Assistant Engineers should have experience in the electricity supply or plant manufacturing industries, preferably in the field of power station planning or design.

Forms from D. Moffat, Director of Establishments, Winsley Street, London, W.1, to be completed and returned by 18th October, 1954. Quote Ref. ER./526. 5313

SURREY COUNTY COUNCIL

APPLICATIONS are invited for the appointment of ASSISTANT ELECTRICAL ENGINEER, Grade VII, salary £735 × £25 to £810 p.a. plus London weighting.

Applicants should be Corporate Members of Inst. Elec. Engineers and experienced in preparation of schemes, specifications, drawings and estimates for, and supervision of, installations of electrical services in large buildings.

Applications, giving full details of present and previous appointments and salary attaching thereto, accompanied by copies of 3 recent testimonials, to the County Architect, County Hall, Kingston-on-Thames, by 9th October, 1954. 5272

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

APPLICATIONS are invited for the following positions within the Division:—

SHIFT CHARGE ENGINEER, AVON POWER STATION, WARWICK (Vacancy No. 148/54/ER.). Applications are invited from qualified Engineers for the position of Shift Charge Engineer at Warwick Power Station.

Applicants should have had experience in the operation of steam turbines and boiler plant.

Salary in accordance with Class E, Grade 7 (£649-£681 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications 11th October, 1954.

ASSISTANT ENGINEER (INSTRUMENTS), DRAKELOW POWER STATION (Vacancy No. 151/54/ER.). Applicants should be experienced on Bailey Automatic Combustion Control and also Kents, Cambridge and Foster Instrumentation of all types. A knowledge of turbine supervisory equipment would also be an advantage.

Salary in accordance with Class J, Grade 10 (£680-£706 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications 18th October, 1954.

These appointments will be pensionable within the terms and provisions of the British Electricity Authority and Area Boards Superannuation Scheme.

Applications should be submitted on the official form A.E.6/ACT, which may be obtained from the Divisional Establishments Officer, British Electricity Authority, P.O. Box 25, Barker Gate, Nottingham, and should be returned to the undersigned by the date stated. Please quote vacancy number.

L. F. JEFFREY,
Divisional Controller. 5310

AUTOMATIC TELEPHONE & ELECTRIC CO. LTD., LIVERPOOL, 7

Communication Engineers and Draughtsmen

THE expanding programme of the Transmission Department offers vacancies in both senior and junior categories for LINE TRANSMISSION LABORATORY ENGINEERS and APPARATUS DESIGN ENGINEERS, and also for DRAUGHTSMEN with experience in telecommunications or light current engineering.

Specialist experience in any branch of line transmission engineering is desirable for some of the posts.

Positions offered are on the company staff with contributory pension fund and usual staff conditions.

Applicants should write to Personnel Manager, Automatic Telephone & Electric Co. Ltd., Strowger Works, Edge Lane, Liverpool, 7, giving full details of age, qualifications and experience.

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MANCHESTER CORPORATION TRANSPORT DEPARTMENT

Assistant Electrical Engineer

APPLICATIONS are invited for the position of ASSISTANT ELECTRICAL ENGINEER at a salary which will be in accordance with Grade A.P.T. Va (£650 rising to £710 per annum) of the National Scheme of Service Conditions.

Forms of application, together with full details of the duties attaching to the post, can be obtained from the General Manager, Manchester Corporation Transport Department, 55, Piccadilly, Manchester, 1, and should be submitted to him together with copies of not more than two recent testimonials not later than 18th October, 1954.

Canvassing is prohibited.

A. F. NEAL,
55, Piccadilly, General Manager.
Manchester, 1.
21st September, 1954. 5297

MIDLANDS ELECTRICITY BOARD

Birmingham and District Sub-Area

Appointment of District Manager

APPLICATIONS are invited for the position of DISTRICT MANAGER in the South East District of the Birmingham and District Sub-Area.

Applicants should have had a wide experience in managerial, engineering, and commercial activities of the Electrical Supply Industry, and preference will be given to candidates who are Corporate Members of the Institution of Electrical Engineers or hold equivalent qualifications.

Salary in accordance with the N.J.M. Agreement, Scale 4, £1,600/£1,750 per annum, superannuable.

Applications, stating age, qualifications, experience, present position and salary, endorsed "District Manager," should be forwarded to Emil Braathen, Manager, Birmingham and District Sub-Area, Midlands Electricity Board, 14, Dale End, Birmingham, 4, not later than 23rd October, 1954.

A. STEPHENS,
Secretary. 5307

TECHNICAL ASSISTANT (ELECTRICAL)

required for Central London office for the design and layout of factory electrification schemes, including substations, H.T. ring mains, transformers, M.T. switchboards, cabling distribution boards, motors, starters and lighting. Electrical contracting experience would be an advantage.

Applicants must be between 25 years and 30 years of age and must hold the H.N. Certificate in Elect. Eng. Preference to man holding the Graduate examination of the I.E.E. Five-day week. Superannuation scheme. Salary according to experience. Successful applicant would have to be passed by the company's medical officer.

All applications will be treated in the strictest confidence and should be addressed to—PERSONNEL DIVISION (WAD.68), UNILEVER LTD., BLACKFRIARS, LONDON, E.C.4. 5255

NORTH WESTERN ELECTRICITY BOARD

APPOINTMENT of FIRST ASSISTANT DISTRICT ENGINEER, WHITEHAVEN DISTRICT.

Duties will be to assist the District Engineer in the control, construction, operation and maintenance of the H.V. and M.V. networks throughout the District. Experience in overhead distribution systems is essential. Preference given to applicants who hold Corporate Membership of the Institution of Electrical Engineers.

Salary scale £850/£887 p.a., Grade F.4, N.J.B. conditions.

Applications for the above appointment to Sub-Area Manager, No. 6 Sub-Area, North Western Electricity Board, Castle Green, Kendal, by 9th October, 1954. 5087

SENIOR TRANSFORMER DESIGNER

required with experience of all types of transformers up to 3,000 kVA. Excellent prospects for an energetic man capable of supervising junior engineers. Excellent working conditions, pension scheme, canteen, etc. West London area. Applications to—Box 5323.

METROPOLITAN-VICKERS ELEC. CO. LTD.

require DESIGN DRAUGHTSMEN for METALCLAD and HIGH VOLTAGE SWITCHGEAR DEVELOPMENT.

Senior and junior positions available according to experience.

Applications, giving details of experience, age, etc., should be addressed to the Personnel Manager, Metropolitan-Vickers Elec. Co. Ltd., Trafford Park, Manchester, 17.

4912

ADMIRALTY—
ROYAL NAVAL SCIENTIFIC SERVICE

SENIOR SCIENTIFIC OFFICERS and SCIENTIFIC OFFICERS required in Experimental Establishments in London, Portsmouth, Weymouth and Gloucestershire areas and Scotland. The majority of the posts are for Engineers and Physicists (particularly with Electronics).

Candidates must be British subjects with an appropriate first or second class honours degree or equivalent high professional attainments.

Salaries: S.S.O. (M) £975-£1,150; S.O. (M) £470-£855. London rates. Somewhat lower in Provinces. All appointments are unestablished (with F.S.S.U.), but with some opportunities to compete for established posts.

Application forms from M.L.N.S., Technical and Scientific Register (K), 26, King Street, London, S.W.1, quoting A.246/52/A. 207

BRITISH TITAN PRODUCTS COMPANY LIMITED

invites applications for the post of

ELECTRICAL DRAUGHTSMAN

at its Grimsby factory.

APPLICANTS should be experienced in the layout of H.T. and L.T. electrical power distribution schemes in heavy industry.

Salary dependent on age and qualifications, 5-day week, staff bonus and superannuation schemes.

Applications to Staff Officer, British Titan Products Company Ltd., Kronos House, Coppergate, York. 5295

BRITISH ELECTRICITY AUTHORITY

Midlands Division

THIRD ASSISTANT ENGINEER (Electrical) is required in the Generation (Construction) Department at Wolverhampton. N.J.B. service conditions, superannuable appointment, salary within Schedule C, Grade 5, commencing in range £649 to £790 and ultimately rising to £858 per annum.

Applicants should have had a recognised training in electrical engineering, and should hold a Higher National Certificate. Experience in the design and installation of electrical equipment for power stations or similar industrial works is necessary.

Apply, quoting Vacancy No. 772MD, on form AE6. available from the Establishments Officer, 53, Wake Green Road, Moseley, Birmingham, 13, by 16th October, 1954. 5312

BRITISH ELECTRICITY AUTHORITY

South Western Division

BOILER HOUSE SHIFT CHARGE ENGINEER required at Portishead "A" Generating Station.

Superannuation scheme. Salary N.J.B. Class J, Grade 9, £719-£750.

Applicants should have had good technical experience preferably in a generating station, and also a thorough practical and theoretical training in mechanical engineering.

Applications on Form A.E.6/ACT, obtainable from the Divisional Secretary, 26, Oakfield Road, Bristol, 8, should be completed and returned by 16th October, 1954. 5309

BRITISH ELECTRICITY AUTHORITY

South Wales Division

Vacancy No. 97/54

APPLICATIONS invited for superannuable N.J.B. appointment of STATION SHIFT CONTROL ENGINEER at Lydney Power Station. Salary D.10, £531-£547 per annum.

H.N.C. and experience in power station control room desirable.

Application forms obtainable from Divisional Secretary, British Electricity Authority, South Wales Division, British Electricity House, Twyn-y-Fedwen Road, Gabalfa, Cardiff, to be returned by 11th October, 1954. 5299

LONDON ELECTRICITY BOARD

Secretary

APPLICATIONS for the position of SECRETARY to the London Electricity Board are invited.

Candidates should have wide experience of the secretarial and administrative work of public authorities, public utility undertakings or large commercial organisations.

The salary will be within the range of £2,750 to £3,250 per annum, but will be settled according to the age, experience and qualifications of the person appointed.

Applications stating age, qualifications, experience and present position and salary should be made by 18th October, 1954, to the Chairman of the Board at 46, New Broad Street, London, E.C.2. 5240

LONDON ELECTRICITY BOARD

Architectural Draughtsmen

APPLICATIONS are invited for the above positions in the Architect's Section of the Chief Engineer's Department in Central London.

Applicants should be neat draughtsmen and preferably have had several years' experience in an architect's office.

The post is graded under Schedule D of the National Joint Board Agreement as Grade 6, £458 to £595 7s. per annum, inclusive of London allowance.

Application forms obtainable from Personnel Officer, 46, New Broad Street, London, E.C.2. Please enclose addressed envelope and quote reference V/1785/R. on envelope and all correspondence. 5290

CONTACTOR SWITCHGEAR LTD.

ENGINEERS required for both Engineering and Estimating Departments for control gear applications up to 1,000 h.p. low and high tension.

The company operates a contributory pension scheme and will share cost of removal in approved cases.

Applicants should have completed their National Service and preferably not over 45.

Write in confidence to the Secretary, Blakenhall, Wolverhampton. 5111

COVENTRY

EXPANDING electrical wholesale company require experienced REPRESENTATIVE to call on industrial users and large contractors in Coventry and the surrounding area. Existing connections handed over to man capable enlarging such connections, with existing contacts. Own staff notified.—Box 5252.

A VACANCY occurs in the transformer department for a technical correspondent and estimator. The post is a senior one and applications are invited from men with experience in the preparation of tenders for both the home and export markets for all classes of transformers. Apply giving details of experience and salary required to — Employment Manager, Messrs. Johnson & Phillips Ltd., Victoria Way, Charlton, London, S.E.7. 5268

A WELL-known firm of electrical component manufacturers require able young man to take charge of small assembly section. Some electrical knowledge and ability to control female staff is essential. Modern factory in Wandsworth (London). Write, giving full details of experience, age and salary required, to—Box 94.

AN unusual opportunity of a really interesting nature, with housing assistance if needed. A cost investigation engineer required immediately by progressive company in pleasant country district one hour west of London, making wide range of products using mechanical (e.g., i.c. engines), electrical and hydraulic mechanisms. Duties would entail cost reduction of products following investigation of function, design, purchasing and production. Applicants must have initiative, sound technical and practical training and experience, and should hold at least H.N.C. Men of mature experience and ingenuity only need apply. Good working conditions and prospects. Canteen facilities. Please write giving age, qualifications, married/single, past experience, present salary, to—Box 5244.

APPLICATIONS are invited from engineers with experience in the cable industry for vacancies in the sales organisation of a large, old-established, London cable making company. The duties will involve a large amount of travelling and possibly tours abroad from time to time. Candidates should state their age, details of their education, experience and salary required. All applications will be treated with strict confidence.—Box 5228.

ARMATURE/stator winder required for repair shop. Good prospects and conditions. London area. State experience and age.—Box 5326.

ARMATURE winder required, excellent conditions and rates, 20 mins. from Waterloo. —Max Arc & Electrics Ltd., Terrace Road, Walton-on-Thames, Surrey. 170

ASSISTANT electrical engineer required in consulting engineer's office. University graduate with works experience, age 25/30, to design and supervise on site contract work for power equipment and installations. Five-day week. Superannuation scheme. Apply stating age, qualifications and salary required to—R. W. Gregory & Partners, Pilgrim House, Newcastle upon Tyne, 1. 5247

ASSISTANT for design of electric motors and generators with H.N.C. in Electrical Engineering or equivalent.—Higgs Motors, Witton, Birmingham. 5235

ASSISTANT required in West Riding for electrical designer on flameproof equipment for use in mines. Opportunity for young man well advanced in his technical studies.—Box 5325.

AUTOMATIC TELEPHONE & ELECTRIC Co. Limited have a vacancy in their Transmission Division at Liverpool for a senior estimating engineer. The duties include the preparation of tenders for line and radio communication systems, and a knowledge of current engineering practice in this field is essential. The position is on the established staff, with contributory pension fund and usual staff conditions. Please write to Personnel Manager, Automatic Telephone & Electric Co. Ltd., Edge Lane, Liverpool, giving details of qualifications and experience, age and approx. salary sought. 5316

AUTOPHONE Limited require qualified development engineer (degree or equivalent) for interesting and varied work on telephone and electronic equipment. Design and practical experience essential. Write fullest particulars to—539, Wandsworth Rd., London, S.W.8. 5187

BRITISH INSULATED CALLENDER'S CABLES Ltd. have the following vacancies at their Prescot works and invite applications: Graduate electrical engineer for development work on high-voltage cables and accessories; Physicist for development work covering the design, manufacture and processing of power cables for all voltages. Applications, quoting reference P/55/54 and giving details of age, qualifications and experience, should be submitted to—The Staff Officer, B.I.C.C. Ltd., Prescot, Lancs. 5317

CHARGEHAND required by Telephone Manufacturing Co. Ltd., Martell Road, West Dulwich, London, S.E.21, to assist in controlling large coil winding section.. Previous experience of coil winding essential. Preference will be given to applicants who have worked in the telephone industry. The position offers scope for advancement to the right type of man. Staff status. Good conditions of service. Pension and staff bonus scheme after qualifying period. Write, call or telephone—Personnel Department (Gipsy Hill 2211). 5304

DESIGN draughtsman. A vacancy exists in our design drawing office for a first-class designer draughtsman for interesting work associated with the development of automobile electrical equipment. He should be at least of H.N.C. standard and experience in the design of light electrical equipment for large quantity production would be an advantage. The post provides excellent scope for initiative and advancement. Reply, stating qualifications, experience and age, to—Personnel Manager, Joseph Lucas Ltd., Great King Street, Birmingham, quoting reference PM/D/93. 143

DRAUGHTSMAN accustomed to the layout of all types of lighting and power installations for industrial and business premises. West London area. Apply stating age, experience and salary required to—Box 5270.

CAMEROONS DEVELOPMENT Corporation require for service in British Cameroons, West Africa, an electrical supervisor. Candidates should have served an indentured apprenticeship in the electrical trade and have had general electrical experience of installing, operating and maintaining power plants as well as local distribution street lighting and house wiring. A knowledge of line and radio telephones is desirable. Candidates should also have attained foreman status. Age limits 25-35, although an older man might be considered for the appointment. Commencing salary according to ability and experience in scale £775 to £1,175. Tours 18-24 months, with generous leave on full pay. Outfit allowance £80. Provident fund contribution 10% employee, 15% Corporation. First class passages are provided, together with free quarters equipped with heavy furniture. Applications, in writing, giving full particulars, to Rubber and Mining Agencies Limited, 52, Leadenhall Street, London, E.C.3. Only applications from candidates selected for further consideration will be acknowledged. This post is exempt from the requirements of the Notification of Vacancies Order, 1952. 5318

DESIGNER required for work on medium and high-voltage power factor correction and furnace capacitors. Must have degree or H.N.C. or the equivalent in electrical engineering, and experience in the design and manufacture of medium/heavy electrical equipment. Good prospects. Write, giving full details of qualifications, age and salary required, to—The Technical Director, A. H. Hunt (Capacitors) Ltd., Bendon Valley, London, S.W.18. 71

DRAUGHTSMAN, electrical, with experience of A.C. and D.C. automatic motor control gear. Altrincham district. State qualifications and salary required.—Box 5161.

DRAUGHTSMAN required at the Rugby works of the British Thomson-Houston Co. Ltd. for layout and detailing of A.C. and D.C. motors and generators. Experience not essential. Progressive position for man of ability. Apply to—Chief Draughtsman, Motor Drawing Office, The British Thomson-Houston Co. Ltd., Rugby. 5048

DRAUGHTSMAN required, capable of designing, with minimum of supervision, electrical engineering installations for all types of buildings. 5-day week. Salary dependent upon age and experience. Apply, with details, to—J. Stinton Jones and Partners, Consulting Engineers, 21, Gloucester Place, London, W.1. 5035

DRAUGHTSMAN required for design and detail work on electrical/mechanical apparatus. Should be at least of H.N.C. standard. Workshop experience essential. Apply in writing to — Personnel Manager, A. H. Hunt (Capacitors) Ltd., Bendon Valley, Garratt Lane, London, S.W.18. 41

DRAUGHTSMAN required for detail work on specifications necessary for manufacture of paper capacitors. Write or call—A. H. Hunt (Capacitors) Limited, Bendon Valley, Garratt La., Wandsworth, London, S.W.18. 95

DRAUGHTSMAN required immediately for Ministry of Supply contracts. Must be used to instrument work. Ordinary National Certificate an advantage. Apply to—General Manager, Hendrey Relays Limited, 392, Bath Road, Slough, Bucks. 5278

DRAUGHTSMEN. Previous experience in motor control equipment circuit work helpful but not essential if applicants are up to O.N.C. standard. Good salary and prospects. For successful applicants requiring housing accommodation, assistance may be given for skilled and key personnel. Pension scheme; 5-day week; canteen. Details of age, experience, qualifications and commencing salary to —Personnel Officer, Dewhurst & Partner Ltd., Inverness Road, Hounslow, Middx. 5159

DRAUGHTSMEN for plant development work. H.N.C. (mech.) preferred. Experience of power cable machines advantage. Good pay and prospects for right men. Pension fund and bonus. Apply—E/53/54, Staff Officer, B.I.C.C. Ltd., Belvedere. 5249

DRAUGHTSMEN required for mechanical design of compressed air components. Some mechanical experience essential. Applications, giving details of experience, age, etc., should be addressed to the Personnel Manager, Metropolitan-Vickers Elec. Co. Ltd., Trafford Park, Manchester, 17. 4913

DRAUGHTSMEN required by South Wales Switchgear Ltd. at their Blackwood works for high-voltage switchgear contract works and diagram sections. Applications giving full particulars of experience, qualifications and salary required to—The Personnel Manager. 5274

DRAUGHTSMEN, sound experience of detailing light mechanical equipment, required by large engineering organisation in London. Salary not less than £11 10s. per week. Pension scheme, good promotion prospects, excellent conditions. Please write giving full particulars of experience and qualifications to—Box 5327.

DRAUGHTSMEN, sound knowledge of electrical engineering, required by consulting engineers for permanent positions in their Bath offices. Good salary, excellent conditions, pension scheme. Please write, giving full particulars of experience and qualifications, to—Box 4968.

ELECTRIC lighting fittings manufacturers (London, old-established) have vacancy for representative. Connection essential. Commencing short period on commission.—Box 5267

ELECTRICAL contractors in N.W. London require keen man to assist in buying and office work of A.M. and general contracts. Some outside duties. Opportunity for upgrading. Details and salary to—Box 7644.

ELECTRICAL/electronic engineer required to take charge of small laboratory. Applicant must have some years' experience in laboratory of manufacturers or large-scale users of any of the following: Cables, capacitors or insulation materials. Maximum age 35. London, E.11 district. Write fullest particulars.—Box 5242.

ELECTRICAL engineer required, age 30-45. To take control of installation of new plant and maintenance of all electrical plant, including cranes. Birmingham area. Must have first-class experience and technical training. Give full details of both. Salary £800 to £1,000.—Box 5286.

ELECTRICAL engineer required by control gear manufacturers in South Manchester. Must be conversant with medium-tension A.C. and D.C. contactor gear and capable of originating schematic circuits. This is a responsible position in a rapidly expanding company and the successful applicant will command a generous salary. Apply—Box 5263.

ELECTRICAL engineer required, age 25 to 35, capable of designing and supervising electrical engineering installations for all types of buildings. Apply, with details of experience and salary required, to—J. Stinton Jones and Partners, Consulting Engineers, 21, Gloucester Place, London, W.1. 5036

ELECTRICAL engineer required in Peterborough area. Applicants should have a good education of at least Higher National Certificate level. Capable of designing conventional multi-motor control panels for machine tools in prototype stage. Knowledge of electronic control an advantage but not essential. Responsible for electrical installation and plant maintenance. Commencing salary £875 p.a. Appy giving full details to—Box 5170.

ELECTRICAL engineer wanted. McLellan & Partners, consulting engineers, have a vacancy on planning and supervision of cabling and plant installation in a large works in South Wales. Salary £650-£900, depending on experience. Write to 32, Victoria Street, London, S.W.1, giving age, education, qualifications and details of experience. 5248

ELECTRICAL fitter and wireman, experienced on power boards and telecommunications contracts. State experience and wages required.—Troughton & Young (Manufacturers) Ltd., 18, Beddington Farm Road, Purley Way, Croydon (Tel. Croydon 6892). 5050

ELECTRICAL fitters are required by the British Electricity Authority at their Nottingham Transmission Section. The nature of the work involved includes the overhaul of 132,000-volt transformers and switchgear at transforming stations within the Nottingham section. Previous experience of H.V. apparatus would be an advantage. Rate of pay 45.00d. per hour, 44-hour week. Terms and conditions of service in accordance with N.J.I.C. Agreement. Applications in writing to Divisional Establishments Officer, British Electricity Authority, P.O. Box 25, Barker Gate, Nottingham. Please quote Vacancy No. 153/54/ER. 5311

ELECTRICAL foreman required for maintenance of high-voltage switchgear, motors, cables, control gear, etc. Commencing salary £505 per annum (range £505/£20/£665). Contributory pension scheme. Apply in writing stating age and experience to—Chief Engineer, The Colne Valley Water Company, Aldenham Road, Watford, Herts. 5150

ELECTRICAL wholesalers require pricing clerk. Previous experience desirable. Gd. salary and pension.—London Electrical Co., 92, Blackfriars Road, London, S.E.1. 5280

ELECTRICAL wholesalers require storesman. Previous experience desirable. Permanent position. — London Electrical Co., 92, Blackfriars Road, London, S.E.1. 5038

ENGINEER required for an engineering department dealing with the application of heating elements to various industrial and domestic processes. A knowledge of heating elements is not essential as a training period will be given. Applicants must have at least Higher National Certificate in Electrical Engineering and be aged 25-35. Salary according to age, qualifications and experience. Write giving full details to the Personnel Manager, Metropolitan-Vickers Electrical Co. Ltd., Trafford Park, Manchester, 17. Mark envelope "Heating Element." 5128

ESTIMATING and supervising engineer required (additional), electrical contractor, Inner London. Good experience essential. Pension scheme. Please write stating full experience and salary required to—Box 7633.

EXPERIENCED counter assistant required by electrical wholesalers at Southampton, Winchester and Farnham. Excellent prospects for suitable man. Apply giving full particulars to — William Dibben & Sons Ltd., 103, St. Mary's Road, Southampton. 7650

EXPERIENCED instrument panel wiremen required S.E. London. Good prospects.—Box 7559.

FOREMAN armature winder required for N.E. Scotland repair shop. Council house available.—Box 5298.

FULLY trained lighting engineer required for London office. Applicant must have good education and preferably be a member of the I.E.S. Apply—Senior Lighting Engineer, Ekco-Ensign Electric Ltd., 45, Essex Street, Strand, London, W.C.2. 5243

HACKBRIDGE & HEWITTIC ELECTRIC Co. Ltd., Walton-on-Thames, Surrey, require the services of a research and development engineer with some experience in motor speed control as applied through mercury arc rectifiers. Apply—Research Engineer. 5207

HACKBRIDGE & HEWITTIC ELECTRIC Co. Ltd., Walton-on-Thames, Surrey, require the services of an engineer experienced in the design and production of instrument transformers and small power transformers. This is a senior position offering considerable scope. Applications should be made direct to the Chief Engineer. 5208

ILLUMINATING engineer for preparation of specialised lighting schemes and quotations. Applicants should be conversant with current trends in interior lighting practice. I.E.S. member preferred. Write stating age, experience and present salary to—Box 5288.

JOINTER, first-class H.T. plumber-cable, required for 12 months' overseas service by firm engineers and contractors. Write stating experience, age, references.—Box 5275.

JOSEPH LUCAS Ltd. have vacancies in their design drawing office for several first-class mechanical designers for work on small motors and switchgear. Applicants should be up to H.N.C. standard and it is desirable that they should have experience in designing for quantity production. The positions are permanent and pensionable and offer excellent opportunities to men possessing initiative and originality. Please reply, stating experience, qualifications and age, to — Personnel Manager, Joseph Lucas Ltd., Great King Street, Birmingham. 142

JUNIOR designers required to deal with small transformers, power, audio, pulse, etc. Specialised training will be given to engineers with suitable basic training and experience. Applications to — Technical Director, Gresham Transformers Ltd., Twickenham Rd., Hanworth, Middx. 5324

INSTALLATION engineers for automatic generating plant, control equipment, switchgear, etc. Experienced in V.I.R., lead-covered, Pyrotenax and other cable work, and also pipework fitting. Applicants must be prepared to travel and preferably own a car. Subsistence and car allowances and incentive bonus paid. Apply—Personnel Officer, Stone-Chance Limited (Engineers), Lighthouse Works, Smethwick, 40. 5328

JUNIOR electrical engineer required for small firm in N.E. At least up to H.N.C. standard with experience of motor control gear and an understanding of schematic and wiring diagrams. Ability to supervise electrical testing and instrument calibration an advantage. State age and salary required. Reply—Box 5279.

LABORATORY assistant, age 25/30, required for prototype testing of f.h.p. motors, general research and development work. Previous experience essential. Write stating age, experience and salary required to —Personnel Manager, Wolf Electric Tools Ltd., Hanger Lane, Ealing, London, W.5. 7654

LARGE mechanical engineering firm near Birmingham requires electrical engineers to assist in the application of electrical control systems to the company's products. Apprenticeship, drawing office experience and Higher National Certificate desirable. Age 21 to 30 years. State age, experience and qualifications to—Box 5254.

LEADING oil company require an electro-mechanical draughtsman for design and detail work on experimental laboratory equipment at their research station near London. Applicants under 30 years of age. Must be in possession of Ordinary National Certificate and if possible should have had 2 years' workshop experience. Salary according to age, qualifications and experience. Pension scheme. Write giving full details, and quoting H.3156, to—Box 7014, c/o 191, Gresham House, London, E.C.2. 5319

LECTURERS required for B.B.C. Engineering Training Dept., Evesham, which is fully equipped with sound and television broadcasting apparatus. Applicants should possess degree or H.N.C. in Elect. Eng. or Physics, and be capable of training staff carrying from operator to graduate. Knowledge of r.f. fundamentals and transmission, pulse technique; optics, audio frequency engineering or acoustics an advantage. Salary £765 rising by 5 annual increments to £1,025 max. Promotion prospects. Requests for application forms to — E.E.O., Broadcasting House, London, W.1, quoting ref. EX.12 E.R. 5287

MECHANICAL engineer required by cable works for production machine experimental and development work. Minimum qualification H.N.C. Age limits 30 to 40 years. The prospects are good and this is an opportunity for a man who likes to see the results of his ideas put into practice. Commencing salary according to qualifications and experience. Pension scheme. Apply in confidence, giving particulars in chronological order, to—Works Manager, Southern United Telephone Cables Ltd., Dagenham Dock, Essex. 5056

MINISTRY OF LABOUR & NATIONAL SERVICE requires an electrical engineer for unestablished post at the Technical and Scientific Register. Candidates (minimum age 25) should hold degree or diploma in electrical engineering and/or equivalent professional qualification, with varied experience of light electrical engineering, preferably including electronics. Duties: assistance in placing work of Register, involving interviews, advice on careers and correspondence. Salary within scale £495 (at age 25) to £745. Application forms from M.L.N.S., Technical and Scientific Register (K), 26, King Street, London, S.W.1, quoting reference D.408/54.A. Closing date, 16th October, 1954. 5241

NETTLE ACCESSORIES Limited, Harper Road, Wythenshawe, Manchester, require representative for London, South of the Thames and London South Eastern Electricity Board area. Car owner preferred but not essential. Considerable scope. Staff pension scheme operative. Apply in strict confidence, giving details of experience, salary required, etc., to —The Sales Manager. 5052

PERSONNEL required for sales office, male or female. Superannuated position. Some previous experience necessary.—Progress Cables & Accessories Co. Ltd., Regent House, Eversholt Street, London, N.W.1 (Euston 5588). 5053

OVERHEAD linesman experienced in erection and maintenance of 33-kV and 11-kV lines. To be stationed at Lochgilphead, Argyll. Applications to — Area Manager, North of Scotland Hydro-Electric Board, Campbeltown, Argyll. 5329

POST Office experienced man. A vacancy exists for interesting work in London area for man with good knowledge circuitry and maintenance of relays. Good salary, excellent prospects. Please write—Box 5320.

POWER cable development engineer required for research and development of H.V. cables and accessories. B.Sc.Eng. desirable. Previous experience not essential. Salary in accordance with qualifications. Apply stating age, qualifications and salary required to—Personnel Manager, Standard Telephones & Cables Ltd., North Woolwich, London, E.16. 5282

QUALIFIED design and development engineer required by small but expanding company manufacturing control switchgear, specialising in limit, micro and rotary switches, in Birmingham area. Excellent prospects for advancement. Write stating past experience, qualifications and age to—Box 7632.

QUALIFIED electrical and mechanical engineers, age from 25/32, with some commercial and technical sales experience, preferably public school or university, required by well-known public company in the West of England to fill executive positions in export division at home and overseas. These appointments offer considerable scope for early promotion. Applications will be treated in strict confidence. Commencing salary £750 per annum according to experience.—Box 5284.

REPRESENTATIVE calling on wholesale and retail trade required by well-known electric lamp manufacturers to cover Eastern Counties. Liberal expenses and commission will be paid. Please write giving full details of past or present employment.—Box 5269.

REPRESENTATIVE required for two associated small companies covering electro-mechanical engineering as applied to electronic equipment and transformers. S.W. London area. Write, stating previous experience and suggested manner of remuneration to —Box 5250.

SECOND assistant plant efficiency engineer (steam turbine and auxiliaries) required in Manchester by consulting engineers to handle testing and investigational work relating to large power station turbo-alternator plants. Applicants should preferably possess an engineering degree and must have had previous testing experience and be thoroughly familiar with the thermal calculations involved in preparing reports on the overall and detailed site testing of turbo-alternators and allied plant. Apply in writing with concise schedule of experience to—Staff Applications, Kennedy & Donkin, 813a, Wilmslow Road, Manchester, 20. 5266

SENIOR electrical draughtsmen required with sound experience in power wiring and layouts for process plant essential. Applications in writing, giving full personal details, to—Ilford Limited, Romford, Essex. 5233

SENIOR experienced electrical engineers required for employment by large oil company operating in Venezuela, South America. Candidates should be between 30 and 40 years of age, possess a university degree in electrical engineering or A.M.I.E.E., and have approximately 10 years' experience in the operation and maintenance of power houses, H.T. transmission and distribution. They should have already occupied a position of senior administrative responsibility. These vacancies offer a permanent career involving overseas tours of 3 years' duration with 3 months' U.K. leave at the end of each tour. Leaves are fully paid with free passages for employee and family; local leave first and second years. Furnished accommodation supplied for single or married men. Contributory pension scheme covers both employee and family; kit allowance paid. U.S. dollar salaries in line with qualifications and experience; details given at interview. Travelling expenses paid for interview in London. Please write in confidence stating age, qualifications and full details of experience to — Box ZB.66, Deacon's Advertising, 36, Leadenhall Street, London, E.C.3. 5197

STOREKEEPER required by London electrical contractors. Some experience essential. Full details of experience, salary, etc.—Box 5132.

SOUTH Africa. Established company has vacancy for shift charge hand in the paper-lapping and layup sections of its dry core telephone cable plant. Single man preferred. Pension and other welfare amenities available; passage paid. Applications should give full details of previous experience and qualifications and will be treated in confidence.—Box 5198.

SPECIFICATION engineer wanted, must be able to prepare engineering specifications for cable accessories. Drawing office and/or workshop experience is desirable. This is a staff appointment and is pensionable. Good working conditions and prospects. Apply to the Secretary, W. T. Glover & Co. Ltd., Trafford Park, Manchester, 17. 5330

SWITCHGEAR design draughtsmen for mechanism and circuit breaker work required by South Wales Switchgear Ltd., Blackwood, Mon. Applications giving experience and qualifications, etc., to—The Personnel Manager. 5276

TECHNICAL assistant required for testing H.V. cables. Ordinary National Certificate required. Reply giving full details of experience, age and salary required to—The Secretary, W. T. Glover & Co. Ltd., Trafford Park, Manchester, 17. 5273

TECHNICAL assistants required for investigational work in connection with radio valve manufacture. Applicants should possess at least Higher National Certificate. Five-day week, modern welfare facilities, staff pension scheme. Write, giving full personal details, including age, qualifications and experience.—Box 5277.

TECHNICAL sales correspondents are required by Sangamo Weston Ltd. Applicants should preferably have had previous engineering and commercial experience in connection with electrical measuring instruments, but those similarly employed in some other branch of the light electrical engineering industry will be considered. Age desirably 25/35 years. Applications in writing to—The Employment Manager, Great Cambridge Rd., Enfield, Middx. 5283

TECHNICAL sales engineer. Engineering and estimating work for automatic electrical motor control gear manufacturers. Altrincham district. State experience, age, salary. — Box 5162.

TIME study and rate fixing engineer required by cable works. Applicants, between the ages 25 to 35 years, must have had experience in this type of work and be conversant with trade union procedure. Salary according to age, qualifications and experience. Pension scheme. Apply in confidence, giving particulars in chronological order, to — Works Manager, Southern United Telephone Cables Ltd., Dagenham Dock, Essex. 5055

TRANSFORMER draughtsman for all types up to 500 kVA, for rapidly expanding company in Surrey. Situation offers excellent opportunity for advancement. Good commencing salary. House could be arranged. Reply in confidence.—Box 5331.

WORKING foreman required for small winding and repair shop, all types of motors up to 50 h.p. West London area. Age 40 and above preferred.—Box 5134.

YOUNG engineering graduates required for switchgear design and development, sales and contracts. Applicants should have completed National Service and have had some practical experience in industry. Postgraduate training course available for men who have had no previous industrial experience. Please apply to—The Personnel Manager, Ferguson Pailin Ltd., Buckley Street, Higher Openshaw, Manchester, 11. 5285

APPOINTMENTS FILLED

Dissatisfaction having so often been expressed that unsuccessful applicants are left in ignorance of the fact that the position applied for has been filled, may we suggest that Advertisers notify us to that effect when they have arrived at a decision? We will then insert a notice free of charge under this heading.

SITUATIONS WANTED

ELECTRICAL engineer, long experience in management of contracting and general installation, seeks post South West of England. —Box 7646.

QUALIFIED senior control gear sales eng., exp. leading manufacturer, seeks prog. opening, commencing sal. region £1,000.—Box 7645.

ITALY. Ing. Dipl. A.M.I.Plant E., H.N.C. (distinctions), electrical, executive post, would consider reasonable offers full time position technical representative in Italy for major British concern. Italian nationality, 34, energetic, good address and presence.—Box 7653.

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By Order of the Liquidator, D. H. Pexton, Esq., F.S.A.A., re Palmac Engineering Co. Ltd. (in Voluntary Liquidation).

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A.C. and D.C. motors, all sizes, large stocks, fully guaranteed. — Milo Engineering Works, Milo Road, East Dulwich, S.E.22 (Forest Hill 2278-9). 102

A.C. and D.C. motors, generators, from stock.—Service Electric Co. Ltd., Honeypot Lane, Stanmore, Middx. (Edgware 5566/9). 91

A HIGH-vacuum impregnation unit or single or batch coil impregnation service to RIC Specification 214 or individual requirements.—Blickvac, Hamilton Road Works, Hamilton Rd., London, S.E.27 (Tel. Gipsy Hill 4394). 44

A.C. and D.C. house service meters, all sizes, quarterly and prepayment, reconditioned, guaranteed one yr. Repairs and recalibrations. —The Victa Electrical Co., 47, Battersea High Street, S.W.11 (Tel. Battersea 0780). 238

A.C./D.C. meters.—The Electric Meter Co., Dept. ER46, Castle Circus House, Torquay. 7627

ALTERNATOR control panel cubicles, 1,000 kW, 500 kW, 250 kW, 150 kW, 3-phase, 400 volts.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 31

ALTERNATORS for sale. All sizes, voltages and frequencies up to 500 kVA. Exciters, automatic voltage regulators and switchboards available. For the most part unused and guaranteed for twelve months.—Fyfe, Wilson & Co. Ltd., Station Works, Bishop's Stortford, Herts. 5334

ALTERNATORS, 2 to 30 kW, 1 and 3-ph., and D.C. generators, 300 w. to 24 kW. Lists.—Powerco Ltd., Wandsworth Town Station, York Rd., London, S.W.18 (Vandyke 5234). 151

ALTERNATORS, 3-phase, all sizes in stock from 7 kVA up to 330 kVA.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1 (CLErkenwell 5512). 33

BARGAINS in electric motors are always being obtained from A. Cooksley & Co. Ltd., 21/25, Tabernacle Street, London, E.C.2. Stocks include A.C. and D.C. motors, second-hand and new up to 30 h.p. Starters, slide rails and pulleys. Ring Mon. 3355 for your requirements. 50

CIRCUIT breakers, various sizes in stock, A.C. and D.C., 200 amperes up to 2,000 amperes. Also dynamo and alternator switchboards.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 37

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DIESEL generating sets, English manufacture, direct current, all voltages, all sizes to 500 kW.—Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, London, N.1. 17

DIESEL generating sets, English manufacture, 3-phase, all sizes to 500 kW.—Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, London, N.1. 16

ELECTRIC cable. Heavy duty industrial TRS PILCSWAS, etc. Send for list of over 50 types at greatly reduced prices to clear warehouse.—Box 4902.

ELECTRIC generating sets for sale. Diesel, steam, petrol and gas for lighting, power, welding, etc. Very large stocks of engines, alternators and generators held, which can be coupled up at short notice to suit especial requirements.—Fyfe, Wilson & Co. Ltd., Station Works, Bishop's Stortford. 5335

ELECTRIC motors, dynamos, alternators and motor generator sets of all sizes. We hold one of the largest stocks in England. New and reconditioned, with 12 months' guarantee.—Britannia Manufacturing Co. Ltd., Britannia Walk, London, N.1 (Clerkenwell 5512, 3 lines); also Works and Stores, Chobham, Surrey. 20

ELECTRIC motors, generators, control gear, transformers, A.C. and D.C., new and reconditioned; all covered with our usual 12 months' guarantee; large stocks available.—Electropower Co. Ltd., Kingsbury Wks., Kingsbury Rd., London, N.W.9 (Colindale 4621-2). 42

ELECTRIC motors, generators, motor generator sets, transformers, switchgear, etc., large comprehensive stock, overhauled and guaranteed. Copy of our Register, "Electrical Surplus," containing thousands of items of electrical plant, sent on request.—R. F. Winder Ltd., Belgrave Electrical Works, Leeds, 2. 54

ELECTRICIANS. Send for details Shaftesbury lightweight "Bantam" ladders. Top sections fitted with patent moulded rubber blocks, eliminate possibility of scratching or marking walls, fascias, and other painted or highly polished surfaces. Also available for immediate delivery, steps, platform steps, trestles, telescopic trestles, pole and builders-type ladders, and all sizes of two and three-section extension ladders.—Shaftesbury Ladders Ltd. (E. R.), 453, Katherine Road, London, E.7 (Phone: Grangewood 3363/4). 23

ELLISON: 5 off 300 a., T.P. C/O switches, 1 off 300 a., T.P. N, C/O, 12 off 60 a., T.P. C/O. Latest type, as new. Various T.P. circuit breakers including, 450 a., 300 a., 250 a., and smaller.—J. S. Ramsbottom & Co. Ltd., Keighley. 64

FERGUSON Pailin type B.V.4, 11-kV, 3-phase, 50 cycles, 400-ampere oil immersed circuit breaker.—Whitefield Machinery & Plant Limited, Cobden Street, Salford, 6 (Tel. Pen. 4740). 5137

FLUORESCENT Eerleon fittings and control units. Data on request.—H. Strong & Son Ltd., 20-21, Church La., London, N.W.10. 219

FLUORESCENT fittings and control gear for home and export. Wide range competitively priced. Catalogues from — Rada, 148-150, Curtain Road, London, E.C.2 (Shoreditch 8275, 4 lines). 237

FLUORESCENT fittings, lamps, starters and control gear for home and export. Fully guaranteed by actual manufacturers. Send for catalogues. — The Anglo - American Electrical Company, Olive Street. Bury, Lancs. 245

FLUORESCENT tube renewal service. New guaranteed fluorescent tubes (to British standard specification) supplied at 7s. per 5-ft. tube and 6s. 4d. per 4-ft. tube against return of old used tubes.—Fluorescent Starters Ltd., Springfield Road, Guiseley, Leeds. 76

FOR sale. Three 1,000-kW diesel sets, each 400/3/50, with all equipment for complete power station.—Fyfe, Wilson & Co. Ltd., Station Works, Bishop's Stortford. 5337

FOR sale, 20 Bratt Colbran 1-kW electric panel fires, £5 5s. each.—Phone Staines 4102. 5227

FRACTIONAL h.p. motors, new, ex stock, A.C./D.C., Universal, B.T.H., Delco-Remy, G.E.C., Fracmo, Newman, Scophony. — Jeary Electrical Co. Ltd., 5, Lamb's Buildings, London, E.C.1. 38

GENERATING sets, petrol and diesel-driven, up to 30 kVA, new and reconditioned. Plants built to special requirements; consult us without obligation.—Powerco Ltd., Wandsworth Town Stn., York Rd., London, S.W.18 (VANdyke 5234). 153

GENERATING sets, petrol engine-driven alternators, 220/240 volts, single-phase and 3-phase. — Britannia Manufacturing Co. Ltd., Britannia Walk, London, N.1. 19

GENERATING sets, petrol engine-driven dynamos, 110 volts and 220-440 volts, direct current. — Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, London, N.1. 18

HOOVER portable blowers, 230 v., A.C., new, in case complete with 8 ft. hose and flex, 9" w.g. pressure. £6 5s. ea.—J. S. Ramsbottom & Co. Ltd., Keighley. 66

HOUSE service meters, C. & H., Aron, E.A.C., 20-240 v. A.C., s.-ph., 50 c., 2½ amps., 7s. 6d. each, 1s. 6d. postage; 5 amps., 17s. 6d. — Universal Electrical, 217-221, City Road, London, E.C.1. 28

HOUSE service meters.—The Electric Meter Co., Dept. ER46, Castle Circus House, Torquay. 7629

IMMEDIATE delivery new 330-kVA, 400-volt, 3-phase, 50-cycle, 4-wire B.T.H. alternator direct coupled to 400-h.p. Paxman diesel engine, 1,000 r.p.m., complete with switchboard and A.V.R. control.—C. J. Ferguson & Sons Ltd., 33, Barbican, London, E.C.1 (Monarch 5474/5). 104

MOTOR generator sets and converters, all sizes and voltages from ½ kW up to 500 kW in stock.—Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, City Road, London, N.1 (Tel. Clerkenwell 5512, 5513 & 5514). 12

MERCURY switches are made by Hall, Drysdale & Co. Ltd., of 58, Commerce Road, Wood Green, London, N.22 (Tel. Bow 7221). 182

METERS, reconditioned, all types, AC/DC, quarterly credit, single or three-phase, 3/4-wire, 2½/100-amp. Prepayment single, dual and triple coin, fixed or variable tariff, 2½/50-amp. Delivery ex stock, guaranteed, free catalogue lists 200 types. Trade discount 33⅓%.—The Electric Meter Co., Dept. ER/46, Castle Circus House, Torquay (Tel. 7963). 7626

MOTORS. Large stock all types, reconditioned, at one half makers' price, ½ to 300 h.p. Switchgear available.—J. S. Ramsbottom & Co. Ltd., Keighley (3744/5/6). 46

M.V. type K.O.B. metalclad, single busbar, horizontal draw-out type switchgear, 3-phase, 50 cycles. Rated breaking capacity 100 MVA at 6.6 kV. 11 units for disposal in good serviceable condition. For full particulars apply —Box 5231.

NAMEPLATES, engraving, diesinking, stencils. — Stilwell & Sons Ltd., 153, Far Gosford Street, Coventry. 22

NEW 12.5-kVA, 380/400/3/50 Lister diesel set, 1,000 r.p.m., radiator for tropics, switchboard, cancelled export.—Fyfe, Wilson & Co. Ltd., Station Works, Bishop's Stortford. 5336

ONE Everett Edgcumbe maximum demand indicator, 3-phase, 4-wire, 50 cycles, 10-minute periods. Price £35 or nearest offer.—Longford Engng. Co. Ltd., Bognor Regis. 5281

ONE mercury arc rectifier, 3 phase, 50 cycles. Output 450 kW, 230 volts D.C., 2 wires, complete installation.—Box 5138.

PAPER cables, most sizes in stock at competitive prices.—E. M. Tatton & Co. Ltd., Kew Bridge, Brentford (EAL. 3155). 117

PILOT motors, single to three-phase, various sizes up to 90 h.p.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 34

PLATING dynamos and motor generator sets, various sizes from 500 amps. up to 2,000 amps., with A.C. or D.C. motors.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 15

POLYPHASE kilowatt hour meters. Available from stock.—Universal Electrical, 221, City Road, London, E.C.1. 72

POLYPHASE 3/4-wire meters.—The Electric Meter Co., Dept. ER46, Castle Circus House, Torquay. 7630

PREPAYMENT meters.—The Electric Meter Co., Dept. ER46, Castle Circus House, Torquay. 7631

PREPAYMENT 1s. slot house service meters. —Universal Electrical, 217-221, City Road, London, E.C.1. 27

PURLEY chokes and ballasts. Our 80-w. tapped h.p.f. ballast with starter switch-holder incorporated is proving itself the most popular unit. Suitable for most fittings. 57s. 6d. each subject.—F. W. Blanshard Ltd. (Dept. ER), Purley, Surrey (Uplands 4818/9). 52

ROTARY converters in stock, all sizes; enquiries invited. — Universal Electrical, 221, City Road, London, E.C.1. 25

SLOW speed geared motors, any h.p., any speed, from stock, slipring and squirrel cage, 1 h.p. to 250 h.p.; new and s. hand.—Richard Wilson, Thornhill Elect. Works, Bradford Road, Stanningley, Nr. Leeds (Tele. Pudsey 4291/2). 106

STARTERS. 12 off new Ellison 60 a., S/D. 2 off Ellison 50 h.p. auto transformers. Many others.—J. S. Ramsbottom & Co. Ltd., Keighley. 65

STARTERS, 80 h.p., 230 v. D.C., cubicle type, brand new, 2 off.—J. S. Ramsbottom & Co. Ltd., Keighley. 45

TIME switches for sale. Reconditioned or new. Immediate delivery; 12 months' guarantee. Lists from — J. W. Hughes, 3, St. Thomas Street, London Bridge, London, S.E.1 (Tel. Hop 2759). 241

TRANSFORMERS, new and secondhand, all voltages up to 10 kVA; also 50 kVA, 9,000/220/3/50, £95; 200 kVA, 400/200/3/50, £195. —Powerco Ltd., Wandsworth Town Station, York Rd., London, S.W.18 (VANdyke 5234). 152

WARD Leonard motor generator sets, all sizes.—Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, London, N.1 (Tel. Clerkenwell 5512). 10

VENNER time switches, 200-240 v. A.C./D.C., 10-50 amps., from stock.—Universal Electrical Co., 221, City Rd., London, E.C.1. 29

WELDING dynamos and welding sets for sale.—Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, London, N.1. 11

WELDING generator sets. 3-ph., 50-cy., 400-volt motor coupled to 10-volt, 400-amp. D.C. generator. Extractor fans, Keith Blackman, 400/440 volts, 3-ph., totally enclosed. 50-cy., 950-r.p.m. flameproof motor with 15" fan. Few only.—Leslie Dixon & Co., 214, Queenstown Rd., Battersea, London, S.W.8. 5178

WELDING 150-amp. generators, 1,500/2,000 r.p.m., 85/65 v., Mawdsley, unused, foot mounted, B.B., £65 ea.—Powerco, Wandsworth Town Station, York Road, London, S.W.18 (Vandyke 5234). 148

12½-h.p., B.T.H. variable speed commutator motor, 1,500/215 r.p.m., 400 volts, 3 phase, 50 cycles, with motor operated brush gear, control panel and separate push button station. £250.—Box 5135.

23 new Brook R7 1-h.p. S.C. flange mounting motors for sale, 1,000 r.p.m., 400/3/50; 24 ditto, 750 r.p.m.—F. J. Edwards Ltd., 359, Euston Road, London, N.W.1. 5253

95-kVA Brush alternator with exciter, 380/420/50/3, 1,000 r.p.m., tropic proof, new, £365.—East Anglian Electrical Co., 44, Magdalen Street, Colchester (Phone, Col. 5097). 7652

160-kW, B.T.H., 230-volt D.C. generator for sale, 696 amps., 325 r.p.m., drive pulley, slate control, panel with meters.—F. J. Edwards Ltd., 359, Euston Rd., London. 5251

400-cycle, 230-volt, 1,500-r.p.m. new G.E.C. alternators.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1 (CLErkenwell 5512). 39

ARTICLES WANTED

WANTED: TOOLS AND STOCKS

COMPLETE sets of tools to produce components for electrical and hardware trades. Good prices will be paid for tools in good condition, either press or moulding tools, or both. We are also interested in redundant stocks of components or finished goods. Fair prices will be paid for good quality lines.—Box 234.

ALTERNATOR, 150 kVA or nearest, 400 volts, 3 phase, 50 cycles, 4 wires, 750 or lower r.p.m. Complete with switchboard. Must be modern machine.—Box 5139.

COPPER wire, enamelled, D.C.C., etc., nickel chrome. Surplus stocks wanted. — Porchester Electrical Ltd., 15/16, Gerrard Street, London, W.1 (Gerrard 7942). 83

DIESEL engines or diesel-driven generator sets, 100 kW up to 400 kW, slow speed preferred.—Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, London, N.1. 14

ELECTRICAL contracting materials required by South African firm of wholesale importers. Interested in quantity offers. Replies in the first instance to be addressed to—Sydney W. Hassall & Co., Daimler House, Paradise Street, Birmingham, 1. 249

MERCURY arc rectifier. Input 400 volts, 3 phase, 50 cycles. Output 460 volts, D.C., 70 amperes.—Box 5140.

SURPLUS laminations, enamel copper wire, screws, nuts, flex. Good prices paid. Full details to—Box 201.

TWO 1,000/2,000-kW Brush/Ljungstrom turbo-alternator sets, 185 lb. p.s.i. working pressure; 6,600 volts, 3-phase, 50 cycles preferred but other voltages considered. The sets complete with surface condenser and all auxiliaries. Reply fully stating age and condition to —Box 5265.

WANTED, D.C. and A.C. ball-bearing motors, motor generator sets, dynamos and alternators. Full details to — Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, London, N.1. 13

WANTED. Ellison circuit breakers, 300/500 and 700 amps., 400 v., T.P. and T.P. and N.—Box 5339.

WANTED for prompt cash, ferrous and non-ferrous scrap, also plant for dismantling. Buyers of secondhand machinery and plant for re-use.—W. & H. Cooper Ltd., 176, Brady St., Bethnal Green, London, E.1. 32

WANTED. G.E.C. 9-kVA alternators, 230/1/50, or similar makes.—Box 5342.

WANTED, one Siemens-Schuckert variable speed, 440-v., 50-cycle, 3-ph. commutator type motor with hand-operated brushgear, 1.85 kW at 2,000 revs. down to .1 kW at 100 revs.—Electric Power Plant Co., Preston Street, Lenton, Nottingham. 5154

WANTED. Quantity ½-h.p., 1,500 revs., D.C. motors, 110 volt or 220 volt.—Box 5341.

WANTED, rectifier, 230v. A.C. input, 230v. D.C. output, 1 amp. — Universal Electrical, 221, City Rd., London, E.C.1. 5202

WANTED, rotary converters, any sizes.—Universal, 221, City Rd., London, E.C.1. 26

WANTED. Transformer, input 400/440/1/50, output 50/100 kVA, 40 volt. Transformer which can be altered or rewound considered.—Fyfe, Wilson & Co. Ltd., Station Works, Bishop's Stortford. 5338

WANTED. 75-kVA alternator, 230/3/50 at 250 r.p.m. or frame suitable. Alternatively 60 kW, D.C., 480 volts, 3-wire, 250 r.p.m. —Fyfe, Wilson & Co. Ltd., Station Works, Bishop's Stortford. 5340

WORK WANTED AND OFFERED

RECONDITIONING OF STOCKS

OWING to the special nature of our organisation we are in a position to reclaim waste or scrap on a commission basis, or as buyers. We can be extremely useful to companies who require the separating of miscellaneous components or products, thus reducing materials costs by eliminating waste. We can also carry out carding and packing.

REMPLOY LIMITED
25 - 28, Buckingham Gate,
London, S.W.1 235

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FISHER FOUNDRIES Ltd., Greet, Birmingham, 11, for Machine Moulded Precision Castings in gun metal and soft grey iron. Tel.: Birmingham, Victoria 0197. 225

A.C. and D.C. motor rewinds and repairs. Prompt service, fully guaranteed.—Edgware 5566/9; Service Electric Co. Ltd., Honeypot Lane, Stanmore, Middx. 92

ARMATURE rewinding service to the trade. Vacuums, drills, grinders, hood dryers, dental motors. Vacuum cleaner armatures replaced from stock. 24-hour service. Every job guaranteed. All vacuum parts, hoses, etc., in stock for any make.—Regam Electric, 95-7, Park Lane, Leeds, 1. 203

DO you want something made in quantity? If it is a metal pressing, an assembled component or precision machining, we can offer you the factory space and manufacturing "know-how." Send us your enquiries.—Metal Components Ltd., Dolphin Road, Shoreham, Sussex (Tel. Shoreham 2224-5). 74

NEON-glasswork, components and installations to the trade. Free quotations from—Rada, 148-150, Curtain Road, London, E.C.2 (Shoreditch 8275, 4 lines). 238

AGENCIES

AGENT required for Midland area by manufacturers of conduit fittings. Must have connection with wholesalers.—Box 7647.

AGENT wanted for South-Western Counties, Wales, Scotland, Ireland, by transformer manufacturers.—Avis & Baggs Ltd., Gosbrook Road, Caversham, Reading. 162

AGENTS already calling on contractors and industrial concerns with established contacts required in all areas by stockists of paper cables.—Box 5261.

SALES representatives, if you are already calling on electrical contractors, engineers and any other tool users, why not add tool kits to your range. One representative enclosing orders for four more kits informs us "they are being very well received." He earned £57 in 6 days. Apply details—Box 7614.

SELLING agents required by old-established manufacturing company for various electrical lines, including black adhesive insulating tape. Commission basis only, in the following territories: (1) North Scotland; (2) South Scotland; (3) North Wales; (4) South Wales; (5) South-West England. Only agents who are well established and already carrying high quality products selling to electrical wholesalers, contractors and nationalised industries need apply.—Box 5179.

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REPRESENTATIVES calling on industrial works and engineering concerns required on commission basis for sale of high-speed steel cutting tools in the London, Midland and Lancs-Yorks areas. Applications considered only from those with established connections and preferably handling parallel lines. Apply stating full details of current activities and area covered to—Box 7616.

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ELECTRICAL contracting business for sale, private company (E.C.A.), North of London. Purchase price may be satisfied in part by an issue of preference shares.—Box 7636.

ELECTRICAL, radio and television engineers, established 40 years, Hampshire market town, £9,000 turnover, long lease, audited accounts, all leading agencies.—Box 7648

PARTNERSHIPS

DIRECTORSHIP required electrical manufacturing. Can introduce wide connection. Capital £15,000 to £20,000 available.—Box 5344

PATENT NOTICES

THE proprietors of British Patent No. 677491 are prepared to sell the patent or to license British manufacturers to work thereunder. It relates to "Improved process for the electrolysis of solutions of alkali metal chlorides." Address—Boult, Wade & Tennant, 112, Hatton Garden, London, E.C.1. 5289

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"SOUND Recording and Reproduction." By J. W. Godfrey and S. W. Amos, B.Sc., A.M.I.E.E., in collaboration with the B.B.C. Engineering Division. Covers in detail the theory and practice of disc, magnetic and film recording with special reference to equipment used by the B.B.C. A number of appendices contains much reference information not readily available elsewhere. The volume is illustrated by over 170 photogaphs and drawings. 30s. net from all booksellers. By post 30s. 8d. from Iliffe & Sons Ltd., Dorset House, Stamford St., London, S.E.1.

CLASSIFIED ADVERTISEMENTS ARE PREPAID

COMPANY MEETINGS

Copy can be accepted up to first post on Monday of the week of issue.
Price £20 per column and pro rata.

A. C. COSSOR

A Satisfactory Year

THE 16th Annual General Meeting of A. C. Cossor Limited was held on 23rd September in London, The Rt. Hon. Lord Burghley, K.C.M.G., LL.D. (the Chairman) presiding.

The following is an extract from his circulated Address:—

The issue of a further 1,600,000 Ordinary shares of 5s. each in October last raised the Ordinary Capital ranking for dividend from £600,000 to £1,000,000, and it is on this increased amount that the Directors now recommend to you a dividend of 10%.

The year's trading was satisfactory. A small increase in turnover, combined with a small increase in the rate of profit earned, raised the Group Trading Profit to £527,419, compared with £464,917 in the previous year. The Net Disposable Profit is £142,260 (as compared with £89,417 last year).

Out of this we require £71,500 (as compared with £49,125 last year) to provide for the dividends on the 6% Preference shares and 10% on the increased Ordinary share capital. For the privilege, however, of giving shareholders this return—modest enough by any standards—on the money they have provided, we are mulcted in no less a sum than £26,000 of extra Profits Tax. This discriminatory taxation of any return whatever on capital furnished in the form of shares is unsound in principle and pernicious in its effect; no other form of capital is thus taxed, and at least some reasonable return should be allowed.

After these provisions the accumulated profits carried forward are increased by £44,760 to £121,524.

Trading and Outlook

In the Television field we shared the good year which the trade enjoyed, largely owing to the heavy "out of season" sales induced by the Coronation. We were well among the leaders in developing tunable receivers, and all our new sets now have that facility.

The current year has begun with some slackness in the trade, but the recent removal of the restrictions on hire-purchase has released a considerable latent demand, and we look forward to a better year than at one time seemed likely.

Sales of Radio receivers remained unusually low during the first part of the year; they later, however, took a definite turn for the better. Here again, a technical development has been induced by the decision to proceed with a number of Very High Frequency transmitters at an early date, and to adopt for them the system known as Frequency Modulation. Reception on our new sets incorporating this feature is remarkable for absence of interference, and a revelation for purity of reproduction.

Your Company has for many years been associated with the design and manufacture of electronic equipment essential for the operation and safety of aircraft. This close association was vividly demonstrated at the Flying Display at Farnborough, where our exhibits included the large Surveillance Radar equipment which we have developed, produced and installed for both civil and military use. One of these is now working at London Airport. In the face of intense competition from America we have succeeded in selling this radar, not only in this country, but also in Holland and Switzerland. We look forward with confidence to sales elsewhere.

In our other fields of activity we are running normally and well. I think I can say that we view the outlook for the current year without any serious misgivings.

The report was adopted. 5256

Continued on next page

COMPANY MEETINGS

Continued from previous page

STERLING CABLE COMPANY

Dividend Maintained

Mr. J. S. Clark on Foreign Competition

THE Sixth Annual General Meeting of Sterling Cable Company Limited was held on 21st September in London, Mr. J. S. Clark (Chairman and Managing Director) presiding.

The following is his circulated address:—

I have the pleasure to submit the report of the directors and the accounts of the company for the year ended 31st March, 1954. You will see that these accounts indicate a set-back from last year's record profits and trading. The net profit after all charges was £80,611 (against £130,125 last year) and after providing £57,953 for taxation we have £22,658 for appropriation, compared with £46,205 last time. Although this result enables us to maintain our dividend at 10%, it does reflect the difficult trading conditions met with in the latter part of the financial year.

In August, 1953, copper was freed from control, but this did not cause an immediate increase in trade, the general opinion among users being that the metal price would plunge downward. Buyers held off, and it is not surprising that our export sales suffered most from this situation. It was only late in the year, when metal prices appeared to be steady, that the rush of orders came and the export market regained some stability.

We had also to cope with a revision of British Standards, which, by virtue of reduced physical dimensions, brought about a reduction in selling prices, even on our stocks of finished cables manufactured to the old Standards.

Development

During the year under review much time was devoted to the development of new types of cable for the communications industry. I am happy to say that we are now feeling the benefit of the time and money spent on this development.

Since the end of the year the long awaited Government reaction to the Report of the Monopolist Commission has been made known. This has had the effect of stabilising the home trade in our industry; but it is still too early to prophesy the final result of this somewhat drastic trading "shake-up."

You will wish to know something about our future prospects. I can only say that our order book is once again assuming the healthy proportions of some two years ago, and it is encouraging to note the manner in which overseas engineers are adopting the new types of cable now being manufactured.

Foreign competition continues to be irksome and to curtail profit margins, and it may, therefore, be too early to expect a rapid upward swing, but we must regard this fierce competition as a spur, urging us to further efforts to economise in the cost of manufacture whilst seeking to improve the standard of living of all those who work so hard for the success of this company.

The report and accounts were adopted. 5257

DOMESTIC WATER HEATING

Basic Engineering Principles of Electric and Solid-fuel Installations.

THIS book, by Ronald Grierson, M.I.E.E., M.I.MECH.E., sets out the principles of domestic water heating and provides a critical analysis of current practice in the supply of hot water for domestic purposes.

The author applies sound engineering principles to the design of water heating plant of the solid-fuel/electric type, thereby increasing efficiency and decreasing running costs. He deals mainly with the combination of an electric immersion heater and thermostat with a conventional hot-water storage tank, in conjunction with a coal- or coke-fired domestic water heater, this being arranged either as a "back-boiler" or as an independent unit. A suitably arranged installation of this type does, he contends, dispose of the widespread notion that "electric water heating is convenient but expensive."

25s. net. *By post 25s. 7d.*

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5s. net. By post 5s. 3d.

PRODUCTION ENGINEERING : Practical Methods of Production Planning and Control. By J. S. Murphy, A.I.I.A. Among the aspects discussed are: planning a production programme; drawing office organization; manufacturing processes; shop layout; control of production; time and motion study; estimating and costing. No attempt is made to specialize—the principles set out being applicable to widely varying types of industry.

12s. 6d. net. By post 13s.

ELECTRICITY TARIFF HANDBOOK. Gives details of the standard electricity tariffs fixed by Area Electricity Boards. The classes of tariff shown are: Domestic, Commercial (Block and Maximum Demand types), Industrial (Block and Demand types), Farm and Miscellaneous. Other information includes details of the B.E.A. bulk supply tariff and addresses of Chief Commercial Officers of Area Boards.

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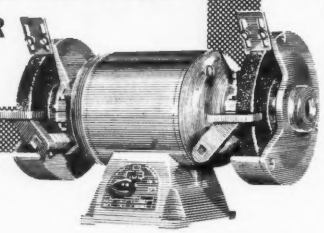

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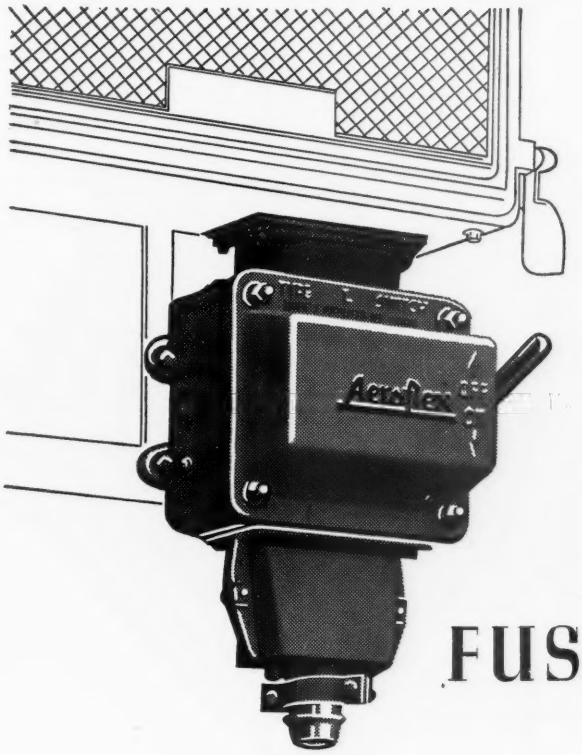

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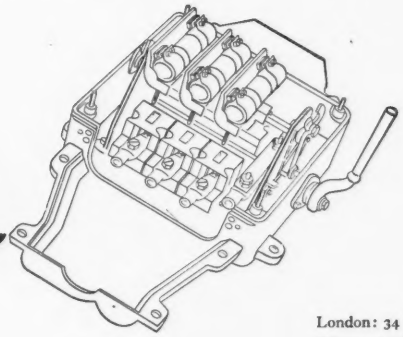

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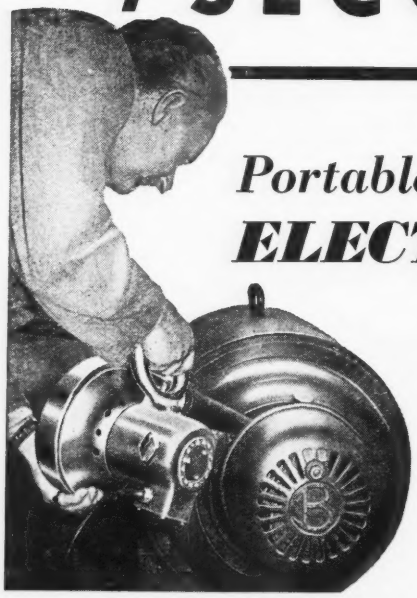

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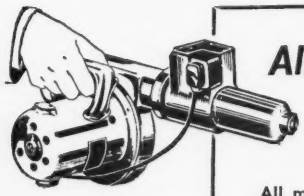

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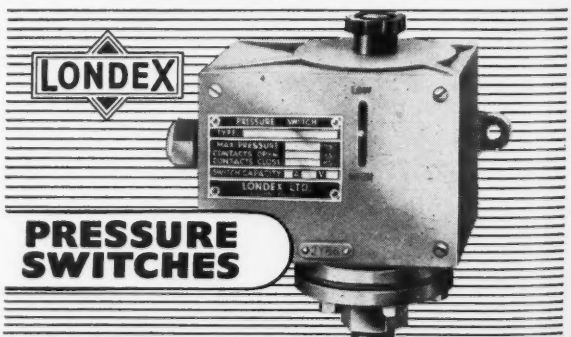

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